ARCHIVES OF OPHTHALMOLOGY.

EXTRACTION OF CATARACT IN THE CAPSULE.[1]

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SO much has been written on this subject that I fear it is difficult to add to it much of interest. However, as few writers with any considerable experience of the operation, except Major H. Smith, I. M. S., of Jullundur, have recorded their actual experience, I think it is of value for other operators to place their experience on record

My experience is based on 576 cases operated on by me, chiefly at the Civil Hospital, Jullundur, where I had the privilege of working for a year under Major Smith. Eighty-one of these cases were done at the Cantonment General Hospital, Meerut.

GENERAL RESULTS.

Suppuration occurred in two cases, leading to total loss of the eye. One of these occurred in a case in which I had to introduce a spoon to extract the lens owing to vitreous appearing at the upper edge of the wound, whilst attempting to extract the lens. Suppuration at the site of the wound occurred in two cases, due, I think, to infection at the first dressing, as it was left to a compounder. One of these cleared up and caused no after-effects at all. The other did not clear up readily, but curiously enough caused scarcely any pain, and the patient left hospital on the eleventh day to proceed home, thinking he was all right. I am unable to say whether it

[1] Read at the Bombay Medical Congress, 1909.

resulted in permanent damage to the eye. This gives a percentage of .34 of eyes definitely lost by suppuration.

I attribute this low percentage to the use of the 1:2000 perchloride of mercury douche. There is no doubt that this lotion is a strong one to use for douching the eye, as I can vouch for from personal experience of it. I had my own eye douched with it, as I happened to get some pus into it. It caused me such pain that I could not open my eye for a time, and it remained painful for four hours afterwards. Of course it must be borne in mind that the patients are all under the influence of a 4 per cent. cocain solution, and do not, as a matter of fact, complain of more than a little pain, but that it is a potent factor in preventing suppuration I think is undoubted, as very few indeed of these cases were given any preliminary treatment for the conjunctiva. I would not have operated on some of them had I not learned from observation at Jullundur that it was safe to do so if one used the douche.

Slight keratitis occurred in two cases, which yielded readily to treatment by a saline purge and pilula hydrargyri internally.

No cases of intraocular hemorrhage occurred in my cases. No case of iritis was seen at all.

Lachrymation.—Troublesome lachrymation occurred in several cases, but usually yielded readily to treatment by instillation of weak zinc-sulphate and boric-acid drops. In one case, which was not relieved at all by this treatment and which persisted for a fortnight, relief was obtained by ordering the patient to douche the eye freely with cold water twice a day.

Marked injection of the conjunctiva, with lachrymation, occurred in a certain number of cases. I attribute it chiefly to an excess of the 1:2000 perchloride lotion left in the conjunctival sac. It yielded readily to local treatment. If any marked pain was present, leeches were always applied and invariably gave relief.

One complication of great interest occurred and I have not heard of a similar one. A man aged seventy-three, an intelligent carpenter, was operated on by me for an ordinary mature senile cataract. His pupillary reaction was normal and projection of light perfect. The cataract was extracted

in the capsule quite easily, without any complication whatever. When the eye was opened for dressing on the fourth day, the man said he could not see fingers held in front of the eye.

The cornea was clear and the eye looked perfectly normal. The wound healed normally and the progress of the case was in every way normal, but he was never able to distinguish more than the movements of the hand in front of the eye and left the hospital after seventeen days in this condition. Before leaving hospital the fundus was examined but appeared normal. I was quite unable to understand why he could not see, and particularly asked him to come back again later to report progress. About three and a half weeks later he came to my house looking extremely pleased and walked into the room obviously seeing, as his other eye had been lost. He stated that, a week before, his sight began to come back and in three days was completely restored. That is to say, after a period of three weeks, during which he could see only hand movements, his sight was completely restored. I had no time to estimate his refraction carefully, but his vision was excellent and I have no doubt will be $\frac{6}{6}$ when his cornea settles down. The fundus was quite normal. It is not possible to say what was the exact cause of this condition. In the absence of a better explanation, it seems possible that the removal of the lens entire, for it was a large one, may have had some effect upon the circulation of the retina, causing a temporary interference with its functions.

The man's mental condition was quite normal, and there is no doubt as to the genuineness of the history, as he was a very intelligent carpenter, who could give an excellent account of his past services.

Escape of the Vitreous.—In my series of cases, escape of the vitreous occurred 29 times. In 22 cases, it occurred during extraction of the lens in ordinary cataracts. In two cases it occurred during extraction of the lens, which had been previously dislocated by the "Rawal" or native lens coucher. Including all cases this gives a percentage of 5.03. Taking cataracts whose lenses were not previously dislocated, this gives a percentage of 4.7 approximately. The only serious complication due to loss of the vitreous, in my series, was drawing

up of the iris, leading to occlusion of the pupil in one case. The eye has recovered and I propose making an artificial pupil for the patient, who is still under treatment. In most of the other cases the escape of the vitreous caused no trouble at all but in a few cases the patient suffered from lachrymation, due chiefly to the edge of the iris being caught in the wound. In two cases the edges of the iris had to be snipped off.

In one case, that of a very old woman, considerable flattening of the cornea resulted, and I was in despair of it getting right. In six weeks' time, however, it became all right and she was anxious to have the other eye operated on. I am in favor of using a pad sufficiently large to exert mild pressure on the eye in cases in which escape of vitreous has occurred. In one case where this was not done, I noticed when the eye was opened on the third day that the cornea at the lower edge of the wound was bent away from the upper edge, and the wound gaping. This was due to a very nervous patient "squeezing" at the time of operation and after. The wound healed quite well, but the iris was drawn up, occluding the pupil as described before. It is interesting that, although the wound was open wide on the third day, no suppuration occurred, and it healed soundly when a firm pad was applied.

The percentage of escape of vitreous in the operation undoubtedly decreases with the experience of the operator and, a point upon which I wish to lay stress, the experience of his assistant.

The first point is well illustrated by my own experience. In my first series of 63 cases at Jullundur in the spring of 1907, escape of the vitreous occurred in six cases, whereas at Jullundur in 1908 I did 64 non-selected cases in two days with only one slight escape of vitreous in one case. In this case, moreover, the patient squeezed out the lens, with a little vitreous, on completion of the incision. The second point is illustrated by my Meerut experience in 1908. In a series of 81 cases, I had escape of vitreous in seven. I had to start operating with assistants who had no previous experience of eye operations at all and very little of surgery. I should mention also I was handicapped by having to operate out-of-doors for the first 40 cases owing to want of proper

light. I am quite sure that had I had a good assistant, at least half of the escape of vitreous would not have occurred. I think therefore it is impossible to lay too much stress on the importance of fully training your assistant. Every operator should, if possible, first act as an assistant himself, to become fully familiar with all the details. When seeing a really good assistant at work, one hardly realizes what an important part he plays in the operation. It is only when one has to train one for one's self, particularly if he be not too intelligent, that one realizes the importance of his part and how much damage he can do. He should be taught, that not only should he keep the orbicularis muscle well under control, but that when placing his thumb in position for this purpose he should draw up the loose skin of the upper lid so as to keep the eyelids well open. If he does not do this, the operator will not have such a good view of the field of operation—a very important desideratum. He should be taught, that he must always watch the patient's expression, and the moment the patient shows any sign of straining he should take hold of the speculum lightly and be prepared to raise it, so as to prevent the patient putting pressure on the eyeball by closing of the lids, and causing escape of vitreous. A good assistant will anticipate this and avert it.

Results as regards Vision.—It is quite impossible to give a statement of the exact vision obtained by every patient operated on in Indian hospitals in the Provinces. At Jullundur, owing to deficient accommodation, the patients are allowed ordinarily to leave the hospital on the sixth day.

The eye is still weak and cannot tolerate light well enough to allow the vision to be tested at a distance. In Meerut my patients are discharged on the tenth day, but that also is too early to allow their vision to be tested other than roughly. I show the patients' groups of small dots, varying in size from one readily seen, down to one as big as the ordinary full stop in print. They are asked to count these with a + 10 D. lens. If they can count down to the last size but one, I am sure from experience their vision will be about $\frac{6}{6}$ when the cornea has settled down. This may not appear very scientific, but it is all one can do, and it is for all practical purposes sufficient. I have had the opportunity of seeing

and testing many cases of my own and of Major Smith's who came back for various reasons, and from an experience which is based on certainly not less than 250 of these cases, I should say that the average vision obtained after this operation, provided the eye was healthy before operation, is $\frac{6}{6}$.

Astigmatism.—I have worked out the refraction of a number of cases and find the resulting astigmatism is usually from + 0.75 D. to + 1.0 D. To European ideas, this statement of results will appear unsatisfactory, as it has not the usual table giving the vision obtained by each case. To those, however, who know the East, and that the native of India is as well able to appreciate the value of an operation as the people of other countries, seeing that he judges by the result only, which after all is the essential point to people of any nationality, the fact that in six months, and that broken up into two periods through enforced absence, I was able to get 81 people to come forward for operation, will appeal as an argument of the first importance. It should be mentioned that this was in a small Cantonment hospital, where no eye-work at all had been done in the preceding year, and that all around are found in every station, operators for cataract by the ordinary method of wide experience. Had my results been worse than those of others near me, no one who has any knowledge of India will deny that my cases would have fallen off as the results became known. I will now make a few remarks on certain points of importance in connection with the operation.

Technique.—My technique was exactly that of Major Smith, to whose kind tuition I owe almost all that I know of this operation; it has been fully described already and will be more fully described later in the press, so I shall not describe it here, but make a few observations on matters which my experience suggests may be of interest. I think that the most important thing in the operation is for the operator to have an exact knowledge of the particular way in which to extract each class of cataract. It is extremely difficult to give a description of the different classes of cataracts classified from the point of view of the operator. It is quite easy to point them out clinically, and I cannot too strongly emphasize the importance of the operator being able to tell

at a glance which class of cataract he has to deal with, and how it will behave. For instruction on this point I advise him to see Major Smith's book, which is coming out shortly, as space forbids me to go into it here.

I strongly recommend any one commencing this operation to spend some time with a surgeon who has a large clinique, and to acquire this knowledge practically, which, in my opinion, is the only satisfactory way. The knowledge doubtless can be acquired by an intelligent operator by actual experiment, a course which is, however, fraught with danger to the patient,—a fact which is obvious when we read of the experiences of operators in America and elsewhere who have tried this operation without a full practical knowledge of the details. It does not surprise me at all, that they condemn it and give it up. I admit at once that the operation is more difficult to learn and more dangerous to the patients, in the hands of a beginner, than is the ordinary operation. I consider, however, that in the hands of an experienced operator the freedom from complications, the avoidance of a secondary operation, and the better vision obtained are of such importance as to render it the ideal operation. When the fact that immature cataract can be operated on at any stage with absolute safety is taken into account, thereby saving patients sometimes years of weary waiting and, as sometimes happens, loss of sight, whilst waiting, from glaucoma or other diseases, an occurrence which I have seen several times myself, I think the advantages of this operation are so enormous as to render it the most important advance in ophthalmic surgery since the time of Daviel. To estimate the value of knowing the exact method of procedure in this operation, I may mention that on several occasions when operating at Jullundur, where both eyes are usually operated on at the same time, I have extracted the lens and had escape of the vitreous, the fact has been pointed out to me that I failed to modify the technique quickly enough. Major Smith has then operated on the other eye, to show me where I had failed, and has had no escape of vitreous at all. Both eyes almost always, if the cataract be of the same degree of maturity, behave in the same manner in this operation. One of the ways in which escape of vitreous occurs

and may be prevented is in the operation for fairly immature cataracts. These cataracts are usually extracted by dislocating the upper edge first, which comes first through the wound. The operator, by pressure directed backwards, dislocates the lens and keeps the pressure up, but the lens does not come out. If the pressure be continued, as it must be, and the lens does not emerge, vitreous may appear above the upper edge of the lens. If when the vitreous is seen in this position, the pressure be still kept up, but its direction instantly changed, so as to cause the lens to be carried upwards, and its posterior surface to pass over the posterior edge of the incision, the escape of vitreous will be averted. Escape of vitreous occurred in this way two or three times to me whilst operating, before I learned to modify my technique instantly so as to avert it. Sometimes the manœuvre has to be combined with counter-pressure with a flat spoon above the wound. It is by slight variations of technique such as this, which are carried out by the experienced operator almost automatically, that the various difficulties which arise are overcome, and escape of vitreous and other accidents are avoided, in this operation. The operator who is able to anticipate the various modifications of technique required in the course of the operation, is the one who will have the best results. If in doubt as to how a particular cataract should be extracted, my opinion is, that the safest way to proceed is to see if the lower edge of the lens can be dislocated first, and the cataract made to turn over and come out with the lower edge first. This is done by pressing with the strabismus hook over the lower third of the cornea with a moderate pressure, the direction of the pressure being towards the patient's feet. If the lens is going to turn over, the lower edge will be seen commencing to dislocate and should not be hurried.

As it dislocates, the pressure with the hook should be changed to the upward direction and the lower edge of the lens be followed up, to help it out and prevent its falling back again.

If however it is not going to turn over, and the upper edge of the lens dislocates first, the direction of the pressure should be immediately carried backwards and upwards, following

up the lens as it passes out through the wound. It is the failure to instantly change the direction of the pressure and to modify its degree, which accounts so often for escape of the vitreous and bursting of the capsule in this operation.

The Importance of Quickness.—I think it is very important, if the patient is very nervous, and particularly if a woman of the higher classes in India, who are, I find, usually very nervous, to extract the cataract as speedily as possible. I find I am most liable to get escape of vitreous in this class of case. It has occurred to me several times, whilst extracting one of the large white-looking mature lenses, which have to be extracted lower edge first, as previously mentioned, that all has gone well, till the slow pressure of the lens turning over has pressed on the iris.

Pain results, the patient strains, and if care is not taken vitreous is very apt to be squeezed out, or the lens capsule to burst. I think the two best ways of guarding these occurrences in this class of case are:

(*i*) To be sure you have a large enough incision. In a patient likely to give trouble, I take care to give plenty of room for the lens to slip out easily. If the incision be made a shade larger than usual, the lens comes out more quickly—a very desirable thing in patients with small self-control. (*ii*) I have lately given chloroform in these cases. I was led to try it first by having a "purdah nashin" woman, of a highly nervous type brought to me for operation. Her other eye had been unsuccessfully operated on by the ordinary operation elsewhere. I concluded she had behaved badly at the time of operation, and that she would do so for me. I decided to give chloroform.

I had no difficulty and the case did perfectly. I think I should have not succeeded so well without chloroform. This case led me to try it in others of the same class, with equally good results. I have done too few to be able to come to a definite conclusion, but I think it merits further trial. I put the patient fully under, completing all preliminary preparations as she is going under. I operate the moment anæsthesia is complete. The eyes are usually turned up, but this does not cause the least difficulty in this operation. The patient soon comes round, and usually is allowed to go to sleep if

possible, as if he does there is less liability to vomiting, I find. He should of course be carefully watched till the anæsthesia passes off. I am fully aware of the increased danger of intra-ocular hemorrhage from vomiting and do not advocate its general use, but it has been of great service to me in the class of case mentioned, and I mention it for that reason.

Iridectomy.—I prefer always to do an iridectomy. The skilful performance of the iridectomy is of special importance in this operation, as you have a large wound and greater liability of the vitreous to escape consequently. The iris should be very lightly caught, in fact scarcely held at all by the forceps, as it is a sticky membrane and adheres to the forceps. If squeezed, the patient is very liable to strain and force out the lens or vitreous, or both. The edges of the iris are rather liable to prolapse, even when they have been carefully replaced, owing to the large wound. This may be suspected if the patient complains of excessive lachrymation when the eye is dressed. If very small it may be left alone, but if large, the eye should be cocainized, and gently washed out with boracic-acid lotion. The upper lid should be raised by an assistant by means of a strabismus hook and the projecting piece of iris snipped off with a sharp scissors. The lachrymation will soon cease if this be done and the eye will settle down and give no further trouble.

I.—CONCRETION IN THE LOWER CANALICULUS WITHOUT CHARACTERISTIC SIGNS.

II.—TWO CASES OF CONCRETION IN THE UPPER CANALICULUS.

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IN the last few years the literature of concretion of the canaliculus has grown amazingly and in 1907 upwards of fifty cases had been recorded. In but four of these however had the upper canaliculus been involved and to this small number Löwenstein[1] has recently added a fifth.

The following three cases of this lesion seem worthy of being reported since in one atypical and misleading signs were present, and in the other two the upper canaliculus was affected.

Case 1.—Obstinate monocular conjunctivitis with but little evidence of a concretion.

The patient, D. B., a woman of fifty, came to the Eye and Ear Infirmary in December, 1908. The records state that at that time she was suffering from an acute conjunctivitis of moderate intensity, the right eye only being involved. She was treated during the winter and spring but no improvement took place. In the early part of July, 1909, she was first seen by the writer, and at that time there were slight swelling of the lids of the right eye and marked injection of the bulbar and palpebral conjunctiva. There was a moderate amount of thick, white secretion which contained large numbers of the ordinary pyogenic cocci. The puncta were slightly prominent, but there was no

[1] Löwenstein, *Klinische Monatsbl.*, 1909, part 1, p. 142.

noticeable thickening along the course of the canaliculi, and no fluid could be expressed from them or from the lachrymal sac. With the lachrymal syringe fluid could be freely injected from the puncta down into the nose. A small probe was passed with little resistance to the tear sac through each canaliculus. There were but two indications of a foreign body. First, the slight dilatation of the puncta, and second, the fact that the passage of a probe through the lower canaliculus caused a minimal amount of bleeding. Otherwise the eyes were negative and the nasal examination showed nothing abnormal. For a month the patient was treated with all the usual means and with an entire lack of success. Finally it was decided to slit the lower punctum on the chance of finding a concretion. This was done and five small brownish bodies, the largest not more than twice the size of a pinhead, were removed from the canaliculus with a curette. Their smooth surfaces made it seem probable that they were individual concretions and not fragments of a large one. At the end of two weeks the conjunctivitis had practically disappeared.

CASE 2.—Concretion in the upper canaliculus.

M. M., a healthy girl of nineteen, developed a conjunctivitis in her left eye during the summer of 1902. Treatment extending over several months at various hospitals was unsuccessful. About a year later she came under the care of an experienced oculist who told her that she had trachoma and treated her with scarification and caustics. When first seen by the writer in April, 1904, there was a very considerable swelling and drooping of the left upper lid. The palpebral conjunctiva was thickened, velvety, and of a deep red color; the follicles were somewhat enlarged. A moderate amount of thick whitish secretion was present which contained large numbers of bacteria. The lower canaliculus was patent and fluid could be injected freely through it to the nose. Tear sac apparently normal. Nasal examination negative. Marked injection also of the bulbar conjunctiva; otherwise the eye was normal. A piece of palpebral conjunctiva was excised for pathological examination and showed the presence of a chronic inflammation only. The case proved most intractable to treatment and little was accomplished other than a noticeable reduction in the swelling of the lids, and as this took place, a small rounded swelling in the upper lid, slightly above and internal to the punctum, became evident. It was not tender and the skin was not movable over it. At first its true nature was not suspected until one day in making

pressure over it a drop of dark-colored pus appeared at the punctum. The canaliculus was then slit and a dark brown concretion the size of a pea removed with the curette. It was possible to introduce a probe half an inch upward and inward from the punctum into the pouch-like dilatation of the canaliculus. Removal of the concretion was followed by a very rapid disappearance of the conjunctivitis.

CASE 3.—Concretion of the upper canaliculus.

E. H., a carpenter, fifty years of age, was seen by the writer in November, 1904. His complaint was of constant watering of the left eye. Examination showed moderate injection of the bulbar and palpebral conjunctiva of the left eye, and a small amount of muco-purulent discharge. There was a rounded prominence over the very inner portion of the margin of the left upper lid and pressure over this caused a couple of drops of thick grayish-white fluid to flow out from the punctum. A diagnosis of concretion was made, the canaliculus was slit open, and several fragments of a rather soft, granular grayish mass were removed. It was about the size of a small pea. Complete relief of the patient's symptoms followed rapidly .

In all three cases the concretions were of a cheesy granular consistency. In No. 1 and No. 2 the color was brown, while in No. 3 it was a dirty gray. Numerous smears were made and all showed many long and short threads, Gram positive, and tending to stain in segments. Rarely a small knob-like thickening could be seen on the end of a thread and between the threads lay many small oval dots. Numerous threads had been broken into short lengths which resembled bacilli and cocci. No branching could be made out in the smears. Occasional large masses of interlacing threads were seen with centres staining deeply by Gram.

In Case 3 cultures were made on blood serum and agar slants, agar stab, and bouillon which had been rendered slightly acid. Although oxygen was carefully excluded, no growth of the organism observed in smears took place.

It seems probable that the organism present in these three cases was similar to the one described in the previous cases of concretion of the canaliculus. In the past it has been variously reported as a leptothrix, a streptothrix, or an actinomyces. Owing to the great difficulty of isolating it in

pure culture its exact identity is still a matter of dispute and until further investigations have added to our knowledge Axenfeld believes that it is best to classify it among the streptothrices.

Of the cases reported here, No. 3 is in no way remarkable except in that the upper canaliculus was involved. Case 2 illustrates well how severe an inflammation may be produced by the long-continued presence of a concretion and how rapid recovery may be after its removal. Here also the upper canaliculus was the one affected. Case 1 was atypical in that no secretion could be expressed from the punctum and there was a slight diffuse swelling of both lids. It seems probable to the writer that the several concretions were strung out in a line in the dilated canaliculus and thus offered but little resistance to the probe and none to the injection of fluid.

So much has been written recently on concretion of the canaliculus that it would be needless repetition to go into the subject at greater length here. A complete consideration of it and of the literature may be found in the articles of Axenfeld[1] and Zur Nedden.[2]

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[1] Axenfeld, *Bakteriologie in der Augenheilkunde*, pp. 257–269.

[2] Zur Nedden, *Klinische Monatsbl. für Augenheilkunde*, 1903, xli., part 2, p. 329; 1907, xlv., part 1, p. 152.

CONGENITAL FISTULÆ OF THE LACHRYMAL CANALICULI.

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CONGENITAL anomalies of the lachrymal apparatus have a special interest on account of their rarity and their variations. Among 108,416 eye patients, Moore (13) found one case with the punctum lacking and one with three puncta. Manz (1) and Galezowski (2) consider these cases not as rare as supposed; in their opinion many cases are overlooked and many not reported. Judging from the few cases of supernumerary puncta recorded in anatomical or ophthalmological literature, this congenital anomaly cannot but be regarded as of comparatively rare occurrence.

For the most part supernumerary puncta have been found in the lower lid, but they have also been observed in the upper. They either have individual canaliculi which empty directly into the lachrymal sac, or unite with the neighboring canaliculus before reaching the sac, or terminate blindly. Sometimes one finds the auxiliary punctum opening into the normal canaliculus, which thus has two openings. Talko (3) speaks of one case illustrating the latter condition, where the second opening in the course of the canaliculus was found located on the border of the lid and the inner canthus of the eye. Under the name of fistula of the canaliculus, Schirmer (4) gives a similar observation in Grāfe-Sāmisch. Vossius (5) describes a case analogous to those of Talko (3) and Schirmer (4), which he considers can be rightly designated as a fistula of the canaliculus. In his case he found on the upper lid just inside of

the normal punctum a second slit-like opening into the canaliculus.

Cases of supernumerary puncta of the lower lid have been reported by Gräfe (6), one; Galezowski (2), four; A. Weber (7), two; W. Zehender (8), one; Manz (1), one; Steffan (9), one; Baer (15), one; Schirmer (4), one; Talko (3), one; Homer (16), one; Fitzgerald (10), two; Streatfield (11), one; and Henle (17) refers to two cases recorded by Foltz. In these cases supernumerary puncta were located in the lower lid near the nose, generally posteriorly, smaller than the normal puncta and lacking a papilla-like prominence.

Bochdalek (12), Van Boyer (14), W. Zehender (8), and Vossius (5) have each reported a case of supernumerary punctum of the upper lid. Bochdalek's case is interesting, and is quoted from the topographical anatomy of Merkel. He found three puncta in the upper lid; two of which were close together in the position where normally the papilla is found, and each had an individual canaliculus, which united before reaching the tear sac. The third punctum was on the inner-upper side of the lachrymal caruncle and connected with a canal which opened into the near-by canaliculus.

Van Boyer's article is especially interesting as it records fistulæ of the upper and lower canaliculi, and his was the first case of fistula of the upper canaliculus to be reported. It is also of interest on account of the origin of the auxiliary puncta. Examination of his case showed four lachrymal puncta. Besides the two normal puncta in their customary locations, there were two other openings, one into each canaliculus. The opening into the lower canaliculus was one millimetre in diameter, its edges concave, the skin somewhat sunken in its neighborhood, as if in this place there had formerly been an abscess. The supernumerary opening into the upper canaliculus was about half as large and appeared in the upper half of the inner canthus and was farther from the normal upper punctum than was the case in the lower lid. The sound passed through the normal punctum was seen through the opening just described, and, on the other hand, if it were passed through the abnormal opening, came out of the normal punctum. The lower lachrymal canal was quite closed by adhesions so that the sound could not be

introduced into the normal or abnormal punctum in the direction of the sac more than one centimetre. After opening up the canal to the beginning of the upper canaliculus, Bowman's probe No. 4 was passed into the sac and nose without difficulty. Here we have a case of four puncta, but with only two in the beginning of the canaliculi. The auxiliary two were the result of an abscess at the inner canthus. For the acceptance of this origin the sinking in of the skin in the region of the lower fistula, as well as the adhesions and strictures, and the history of marked epiphora from childhood, testify.

The following case is one of congenital fistula of the left upper canaliculus. The patient, a woman, thirty-six years old, was observed in the Ophthalmological Out-Patient Department of Carney Hospital. Except for a slight degree of hypermetropia and the condition about to be described her eyes were normal. At the inner canthus of the left eye, at the junction of the skin and mucous membrane on the inner and upper border of the lachrymal caruncle, a round opening, one millimetre in diameter, was seen when the lower lid was retracted at the inner canthus. Injecting fluid with the lachrymal syringe into the upper and lower normal puncta and into the supernumerary punctum resulted in its flowing freely into the nose. The lower punctum was normally located and Bowman's probe No. 4 was readily passed, as was also the case with the upper normal punctum and canaliculus. In the latter case the probe was seen through the auxiliary opening, which opened directly into the upper canaliculus. The probe passed readily through the auxiliary punctum into the nose. This punctum was round, the edges smooth, and there were no strictures, adhesions, or pockets present to indicate that this was ever the seat of inflammation. There was no history of previous inflammation, and the patient remembered seeing the "little hole in her left eye" since she was a child.

In order to explain the origin of anomalous structures of the tear passages it is necessary to recall the development of the same. We find the later authorities agreeing that the naso-lachrymal canal develops from the furrow which is first seen in the human embryo about the middle of the second month of intra-uterine life, located between the nasal apophysis and the superior maxillary apophysis. The epithelial cells

of the floor of the furrow proliferate and penetrate deeply into the underlying channel, which at first is solid but later a lumen develops in it in order to build up a naso-lachrymal duct. This epithelial chain is bound to the epiblast by a very slender pedicle. The upper end of this chain ends at the inner canthus. Later the epithelial chain becomes quite free; the pedicle disappearing entirely. The lower end later comes in communication with the lower nasal cavity while the upper part frees itself from the epiblast and continues into the lower eyelid in order to form the lower canaliculus. The upper canaliculus develops later by a secondary growth. The lachrymal canals begin to provide themselves with a lumen first in the upper part of the canal which then continues into the naso-lachrymal duct. Of the canaliculi, it is the upper which first unites with the free border of the lid, while the lower canal after freeing itself from the epiblast enters later into union with the free border of the lower lid. Concerning the origin of the canaliculi we observe that the writers do not agree. Some [Born (18) and Legal (19)] claim that the upper canaliculus is a continuation of the primary chain of epithelial cells and the lower develops by supplementary growth of the upper part of the naso-lachrymal duct. Other writers [Kölliker (20) and Ewetzky (21)] are of the opinion that the canaliculi develop by division of the upper end of the original naso-lachrymal duct. Cosmettatos (22), Stanculeanu (23), and Matys (24) show by their later investigations that the lower canaliculus is a continuation of the primary naso-lachrymal duct, and the upper develops later by a secondary offshoot of the upper part of the primary naso-lachrymal duct. From the development of the lachrymal apparatus, we can easily explain the anomalies of the supplementary puncta, canaliculi, and congenital fistulæ of the canaliculi. We found in speaking of the development of the canaliculus that from the upper part of the primary naso-lachrymal duct a secondary growth took place, which consisted of a chain of epithelial cells freed from the epiblast which grew both upward and outward to form the canaliculus and also downward to assist in forming the naso-lachrymal duct. An increase in the number of the upper canaliculi is explained if one accepts that instead of one chain of epithelial cells, two developed from

the upper part of the naso-lachrymal duct and grew in the same direction, upward and outward, and later formed two upper canaliculi. An increase in the number of the lower canaliculi would result if the naso-lachrymal duct, instead of continuing as a single duct to form the lower canaliculus, should divide and form two canals, the continuation of which would form two lower canaliculi. Up to the present time there have been several cases of supernumerary canaliculi published.

In the development of the canaliculi we found that from the primary naso-lachrymal duct a secondary growth of epithelial cells was freed from the epiblast and grew in both directions, upward to form the canaliculus and downward to assist in forming the naso-lachrymal duct. Now if for any reason growth did not take place downward but only outward to the border of the lid, we would have a punctum formed opening into a blind canal. Such cases have been reported.

The upper end of the secondary growth of epithelial cells might divide and in this way form two puncta with their individual canaliculi which necessarily would unite before reaching the naso-lachrymal duct; or the supernumerary punctum might open directly into the normal canaliculus, depending upon the point where the division took place. Many of the supernumerary puncta and canaliculi that have been reported illustrate the former condition; whereas the latter condition corresponds with the case reported here of congenital fistula of the upper canaliculus.

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ILLUSTRATING DR. A. N. ALLING'S ARTICLE ON "A CASE OF SUBCONJUNCTIVAL CYSTICERCUS CELLULOSÆ"

FIG. 1.

A CASE OF SUBCONJUNCTIVAL CYSTICERCUS CELLULOSÆ.[1]

By Dr. A. N. ALLING, New Haven, Conn.

(*With two figures on Text-plates XXXI. and XXXII.*)

Rose S. came to the New Haven Dispensary having a spherical cystic tumor, very slightly movable, over the insertion of the internal rectus of the left eye. The conjunctiva was freely movable over it. It was about the size of a pea, and had the appearance of containing a light yellow fluid. There were no opaque spots to be seen and no sign of inflammation about the cyst. The tumor had been observed by the patient for about three weeks. She was an Italian, twenty-one years of age, and had been in this country four years. She seemed in perfect health and gave no evidence of having a tapeworm, nor were there any similar tumors to be found in other parts of the body.

The cyst was excised under cocain without difficulty, except that, in detaching it from the eyeball to which it was adherent, it was ruptured.

The gross appearance was that of a cyst containing a straw-colored, slightly gelatinous fluid, and a white mass which proved to be a collapsed bladder worm.

The microscopic examination showed the collapsed bladder within the cyst walls (Fig. 1). The bladder wall on the inside is lined with soft gelatinous material showing fibrils and scattered nuclei. The outer layer, or the so-called cuticular membrane of parasites, is formed of densely compacted fibrillar tissue, in the deeper parts of which are numerous nuclei. On its surface, which is wavy in outline, is a limiting membrane of still denser tissue. Within the cyst and outside of the bladder are numerous polymorphonuclear leucocytes, a few mononuclear leucocytes, and some red blood-cells.

The cyst wall is composed of two layers, and varies in

[1] Read before the American Ophthalmological Society, July 14–15, 1909.

thickness, making the inner surface uneven. The inner layer is made up of fine fibrils and cells round and spindle-shaped. Its inner surface is lined with cells similar to those of the wall in general, but more compacted and epithelioid in character, hence the name sometimes given—pseudo-epithelial layer. There are also a few blood-vessels to be found. Giant-cells, described by some, were not found.

The outer of the two layers of the cyst wall is composed of dense connective tissue, with larger blood-vessels filled with blood, and of scattered connective-tissue cells. Outside the cyst is found the subconjunctival tissue.

Microscopic studies of the cyst have been made by Makrocki, Gallemaerts, Werner, Fuchs, and others.

Some sections (Fig. 2) show the invaginated neck in numerous folds, also the calcareous corpuscles (Kalk-körper) which occur in parasites. These are spheroidal, elliptical, or kidney-shaped starch-like grains, less than 0.01*mm* in diameter, and composed of carbonate of lime. They occur in the body of the worm as well as in the bladder wall near the head process. The head itself was lost in the section making.

Germany has furnished the greatest number of cases of cysticercus, on account of the prevalence of the habit of eating raw meat. Opportunity for infection, however, is now decreasing rapidly through the enforcement of meat inspection. Whereas von Graefe reported cysticercus in the proportion of one to a thousand eye cases, Hirschberg has not seen a single case in more than ten years. Cysticerci have also been observed repeatedly in France and Italy, but are rare in Switzerland, England, and the United States.

According to an analysis of 324 cases by Ballabans, 170 were in the vitreous; 55 subretinal; 53 subconjunctival; 22 in anterior chamber; 8 in orbit; 3 cases each in iris, under skin of lid, and in Tenon's capsule; one only subchoroidal and in cornea.

Concerning the subconjunctival cases the first observed was reported by Von Siebold in 1838, and up to the present time about 75 are on record. The distribution, according to Ask, is one-third in Germany, 12 in France, 9 in England, 10 in Italy, 9 in Russia, 7 in Austria, 3 in Holland, 2 in Belgium, 1 in Sweden, and 1 in North America.

ILLUSTRATING DR. A. N. ALLING'S ARTICLE ON "A CASE OF SUBCONJUNCTIVAL CYSTICERCUS CELLULOSÆ"

FIG. 2.

The situation under the conjunctiva has been as follows: 3 above, 20 inward, 6 below, 9 outward, 4 above inward, none above outward, 6 below inward, and 1 below outward.

Sixty per cent. have occurred in females. More than one-half the cases have been under fifteen years of age.

The development of the cysticercus takes place in about three months from the time of the lodgment of the six-hooked embryo in the tissues. It has been known to remain alive for a number of years. In some cases the cyst may suppurate or its contents may become calcareous. The average zeit of the cyst is about 10*mm*, but it may vary so that at times is is large enough to interfere with the closure of the lids. There may or may not be inflammatory reaction accompanying its growth or its presence under the conjunctiva. It may be movable over the sclera or adherent to it. Occasionally an opaque spot may be seen on the cyst wall, which is the place of attachment of the body of the worm.

The diagnosis of the subconjunctival cysticercus should be easily made, as a rule. Its evident cystic character would rule out malignant tumors, and its rapid growth would exclude dermoid cyst. The aforementioned opaque spot may sometimes be found.

The method of distribution of the embryo is undoubtedly through the blood-current. The embryos have usually been swallowed with the food by the infected individual, but the possibility of auto-infection, through regurgitation by anti-peristaltic action into the stomach or through filthy habits, has to be considered. Yet, on the authority of Ask, in only one case was it known that the patient himself had a tape-worm. Of the reported cases, in only one were there cysticerci in other parts of the body, and this was doubtful.

In the subconjunctival cases, the embryo probably is carried through the arteries which run along the straight muscles until it finds lodgment in one of the smallest vessels.

A few cases have followed traumatism, but there would seem to be no connection, unless it might be that the local hyperæmia made the situation more likely to attract the embryo which is free in the blood-current.

The possibility of local infection through lodgment of the embryo in the conjunctival sac has also been considered, but

this would necessitate the rupture of the shell or its being dissolved by the tears, which is unlikely. The probability is that the site is purely a mechanical matter. The embryo is borne along in the blood-current, and would most likely take the main trunks and not the branches, at least those which came off at a considerable angle.

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HEMORRHAGIC CENTRAL CHORIORETINITIS IN NON-MYOPIC EYES: A CLINICAL CONTRIBUTION.[1]

By Dr. CHARLES J. KIPP, Newark, N. J.

THE disease to which I wish to call your attention is doubtless well known to all of you, but as no adequate description of it is to be found in any of the text-books with which I am familiar, I have thought it worth while to write out what I have learned of it from clinical observation, and to this have added what I have been able to find out about it in the writing of others.

Loring probably refers to this disease in his *Text-book of Ophthalmoscopy*, vol. ii., p. 138, when he says: "Not infrequently in myopic and occasionally in other eyes there occurs a peculiar form of retinitis right at the macula lutea that would seem not only to be in the outer layers of the retina but also in the pigment layer itself—as if, indeed, exactly at this spot there had been a development of pigment, a sort of hypertrophy of the pigment cell, a pigmentitis, if such a word can be used. This then shows itself by a collection of pigment at and around the fovea, accompanied by little or no other inflammatory symptoms. The pigment is usually collected in a circular mass of greater or lesser density, or it may present a reticulated shape similar to that of the coarser forms of black lace.

"It has usually been assumed that this pigment was the result of a preceding hemorrhage, from the fact that, with inflammation of the retina, we sometimes find, especially in myopic eyes, hemorrhage associated with the pigment changes. . . . The inflammation may, as it often does,

[1] Read before the American Ophthalmological Society, July 14–15, 1909.

extend to the choroid, and then we have the appearance of a spot, chorioretinal disease with choroidal exudation or atrophy and the lustrous surface of the sclera."

Th. Leber[1] refers to this disease at the end of the paper from which is quoted: "Additionally, I may mention here also another form of hemorrhagic chorioretinitis which has its seat in the macular region; it is observed also in non-myopic eyes and is characterized by a marked resistance to treatment and by the frequency of relapses. I have not treated of it more fully here, because the extravasations, which are mostly small, are usually situated in the area of the choroidal foci themselves, and therefore impress one as having their source in the vessels of the choroid rather than those of the retina. This cannot, however, always be determined by the ophthalmoscopic examination. I have in the course of time seen a series of cases of this affection, in part with and in part without syphilitic antecedents, and have encountered a very marked resistance to treatment, whether it consisted of mercurial or other remedies continued for a long period."

C. Schweigger[2] has this to say about the affection: "There is a choroiditis of the macula lutea which makes its appearance in the form of a circumscribed disease focus of about the size of the diameter of the disk. In the region of the macula is seen a grayish spot, surrounded by a hemorrhage. In the course of a few months the blood is absorbed, the grayish spot becomes fringed by black pigment, and sometimes black pigment is also developed on its surface. The impairment of vision is considerable from the first, and it consists of metamorphopsia and a positive scotoma, which, according to the site of the exudation, covers sometimes the point of fixation, at other times a point very near it. . . . This form of choroiditis occurs more frequently in connection with myopia, but is observed also in non-myopic eyes."

I have been unable to find other references to this disease.

Personal Observations.—I have seen this condition in

[1] "Ueber das Zusammentreffen von disseminirter Choroiditis und hemorrhagischer Retinitis oder Netzhautblutungen am gleichen Auge," *Festschrift zur Feier des siebzigsten Geburtstage von Hermann von Helmholtz*, Stuttgart, 1891, p. 54.

[2] *Handbuch der Augenheilkunde*, 6th edition, 1893, p. 400.

persons of different ages, in the young (Cases 1 and 3) and in the middle-aged (Cases 2, 4, 5, and 6), in persons in the best of general health without a sign of other disease, in a person with valvular heart disease (Case 4), and in persons who admitted having had syphilis. I have seen it in both sexes. In all of my cases but one eye was affected when the patient came first under my observation, and in most cases the other eye was not attacked while the patients were under observation—a period of over twenty-five years in some cases. In one of my cases the same disease developed in the other eye three years after the first was attacked.

The disease is fortunately not frequently met with. I cannot state in what proportion of all eye cases I have seen it, as the hospital records have been partly lost.

The symptom which brought the patients to me has always been a more or less sudden impairment of vision; usually the patient describes it as a cloud before the eye, or as a distortion of the objects looked at.

The external parts of the eye showed no signs of disease. The media were in most cases perfectly clear; in a few cases a few floating opacities in the vitreous were present; and in one there was, as the result of a previous iridocyclitis, great cloudiness of the vitreous with large floating flakes in it (Case 5). In not one of the cases have I seen a deposit of precipitates on Descemet's membrane. The optic papilla was in all cases clearly defined and of natural color, and the retinal blood-vessels were normal in calibre. The retina was transparent everywhere except at the macula lutea, where small, thin extravasations of blood of light color were present. The extravasations seemed to be in the inner layers of the retina. There were more than the usual number of small blood-vessels seen in this region. The choroid in the macular region was of a dark grayish or blackish color, while in other parts it was of the normal red color. In the inverted image the area which appeared dark grayish or blackish, in the upright image was of a distinctly dark, greenish hue. Sometimes the discoloration was in the shape of a disk; at other times it appeared as a ring with a reddish area in the centre of it. The discolored area was usually of about one-half of the disk's diameter in size.

Subsequently the following changes were observed. The

retinal extravasations were slowly absorbed without undergoing changes in color; they were in no instance changed into white plaques. Other extravasations sometimes appeared in the same area during the following months. The darkish area under the retina remained unchanged and underwent but little change in color for many weeks and even months, and then it was gradually converted into a grayish-white patch, which later on became much larger. The grayish patch was seldom of the same color throughout; in some parts it was of a lighter color than in others, and, moreover, it seemed somewhat uneven on its surface. Gradually some pigment spots developed on it, more especially near its margins. Retinal vessels were seen on it, some of which were much larger than those seen in this region in the normal condition. Choroidal vessels were never seen in the grayish region. The picture was not that of a patch of atrophy of the choroid, but rather that of a new tissue formation in or under the retina.

Vision was greatly impaired at the time I first saw the patient, and was found to be due to a central or paracentral scotoma. There were no peripheral defects in the field of vision. In only one case have I seen vision improved under treatment—Case 4.

The impression I got from the examination of cases in their earliest stages, is that the disease is primarily one of the choroid. The changes in the retina visible in the upright image were always very slight; it was transparent, or at least so translucent that the hemorrhage in the choroid was distinctly seen, and the extravasations in the retina were small and thin and always of light red color. The extravasations seemed to me to come from capillaries or to be due to diapedesis. Later in the course of the disease the outer layers became opaque so as to hide the choroid, but the inner layers remained transparent and the retinal vessels were in no part hidden. New vessels in the retina were usually seen in the diseased area after the case had been under observation for months. The choroid, except in the region of the macula, never showed signs of disease. In the centre of the disease focus the choroid appeared of a much darker red color than elsewhere (extravasations of blood?), and the dark-colored

area was usually of a round form and in most cases in size less than the disk's diameter. Pigment spots would make their appearance in this area later on, but never to the extent seen in cases of circumscribed plastic chorioretinitis. Months after the patients were first seen this grayish area had extended in all directions, and was often of twice the size of the original dark-colored area. From the fact that no choroidal vessels were visible in the grayish area, even years after the appearance of the disease, I am inclined to the view that in the grayish area the choroid is covered by an exudate, or that the outer layers of the retina have become so opaque as to hide it. I do not remember ever to have seen just such a picture in any other part of the fundus than the region of the macula. Why it should be seen here only, I am unable to explain. Possibly an explanation may be found in the anatomical arrangement of the choroidal blood-vessels in this region. Nuel,[1] who has studied the condition of the choroid in the vicinity of the macula lutea, comes to these conclusions: "In the neighborhood of the periphery of the macula the number of capillaries and small vessels is increased progressively, while the vessels of large calibre become increasingly less in number. . . . In the predominance of the veins there exists a favorable preliminary condition for the production of a stasis of the products of inflammation carried through the vascular channels to the described region. A retention of the inflammatory products is always brought about by the marked slowing in the blood-stream carrying them, which occurs specially in this critical district. The resistance on the part of the wall of the vessel is, moreover, considerably increased in the macular region, inasmuch as the meshes of the capillary network of the choroidea in this region become decidedly finer than in other parts of the uvea."

In several of my cases I had an opportunity to make an ophthalmoscopic examination a few hours after the visual defect was first noticed, and in a few of these patients I had examined the same eyes some time before the visual defect

[1] "De la vascularisation de la choroide et de la nutrition de la retina principalement du niveau de la fovea centralis," *Archiv d'ophtalmologie*, xii., 1892, p. 70; cited from Curt Cohen, "Aderhautabscess hinter der Macula lutea nach perforirender Zundkapselverletzung," *Klinische Monatsblätter f. Augenheilkunde*, Juni, 1908, p. 628.

was noticed and had found the fundus without changes from the normal. In these cases there were always, in addition to the small, thin, light-colored blood extravasations in the transparent or at least translucent retina, changes in the choroid, such as increase in the pigmentation and perhaps a hemorrhage in the membrane visible at the same time. Slight and thin extravasations of blood in the retina, such as are seen in these cases, alone rarely, if ever, cause such great impairment of vision, and therefore we must assume that the outer layers of the retina were involved in, if not destroyed by, the disease when the patients were first seen. According to Ginsberg,[1] "retinitis of the outer layers is always caused by choroiditis or such processes which have caused a circumscribed or diffuse wasting of the chorio-capillaris; that is, the nutritional area of the non-vascular layers of the retina. . . . The changes in the retina in chorioretinitis are usually not of an inflammatory but rather of degenerative character, but it is self-evident that, in addition to the process due to the choroidal changes, simultaneously independent inflammatory changes in the outer layers of the retina, brought about by the same cause as the choroidal disease, may be present."

Leber[2] is of the opinion that, in cases of disseminate choroiditis with hemorrhages in the retina, we have to deal with a combination of two separate and independent affections, both of the choroid and the retina, which are due to a common cause, but not with an extension of the disease from one membrane to the other. On the other hand, Amman[3] thinks that the hemorrhages in the retina in cases of disseminate choroiditis may be the result of an extension of the disease from one membrane to the other, due to the direct contact of the retina with the disease focus in the choroid, by which the retinal vessels in this region undergo inflammatory changes and become either permeable for the blood or a stasis occurs in their peripheral parts.

In the disease under consideration an extension of the morbid process from the choroid to the retina through direct

[1] *Grundriss der pathologischen Histologie des Auges*, p. 340.

[2] *Op. cit.*

[3] Deutschmann's *Beiträge z. prakt. Augenheilkunde*, xxxviii., p. 1; cited from Wilbrand u. Sänger, *Neurologie des Auges*, iv. Band, 1 Haelfte, p. 179.

contact, seems to me to be the most plausible explanation for the simultaneous involvement of both membranes.

With regard to the treatment of this affection, I may say that I have tried nearly everything suggested by others, but without improvement to the vision except in Case 4, where, under the treatment for rheumatism, consisting of diaphoretics, a marked improvement followed three years after the commencement of the disease.

I append the histories of six cases, illustrating different phases of the disease.

CASE 1.—Chorioretinitis hemorrhagica centralis.

S. W., a girl eleven years of age, was first seen by me April 10, 1882. She complained of pain in her eyes. I found she had a mild form of catarrhal conjunctivitis in both eyes. Both eyes were E., and V=$\frac{6}{6}$. Under the usual treatment the eyes got well in a short time.

I did not see her again till January 13, 1885, nearly three years afterward. At this visit she stated that on this day she had discovered that the right eye was blind. Having a headache, she had leaned her head on her left hand, thereby closing the left eye, and had thus discovered that she was unable to see with the right eye. Up to this time she had had no trouble with either eye except the slight conjunctivitis for which I had treated her three years before. The girl is of slight build, looks younger than she is, is very lean, has not yet menstruated, but says that she is in good health. Her physician tells me that she is apparently free from disease of any kind; she is not anæmic. Her urine is free from albumin and sugar. Her mother is in good health, but, like her daughter, very thin. She is very myopic, 13–14 D. The girl's father is dead. I think he died of pneumonia. The examination of the girl's eyes showed that the left eye was E. V=$\frac{6}{6}$. With exception of a narrow zone of atrophy of choroid around disk, on which some pigment spots are scattered, the fundus is normal. The right eye is blind from a central scotoma. The movements of the globe are unimpaired. The eye is normal in appearance. The pupil is slightly larger than that of the left eye, but is active both to direct and indirect stimulation. The vitreous is perfectly clear. The optic disk is surrounded by a narrow zone of atrophy of choroid on which there are pigment spots. The disk is of normal color and transparency; its outline is distinct. The retina is perfectly clear except at the macula, and the retinal vessels are of

normal size and appearance. At the macula the following changes are noted: Around the macula lutea is a bright reflex of oval form, almost white. At the fovea is a round spot of darkish color; a little above this is a spot of triangular form with rounded angles, which in the inverted image is of a darkish-green color, but in the direct image is of a dark color. Above this triangular spot, as well as below the fovea, there are dark red spots, apparently of the size of a pin's head and apparently in the choroid. A little more below the fovea, close to a small blood-vessel, is a large patch of extravasation of blood in the retina. Otherwise the fundus is normal. The visual field is not contracted.

Three days later I examined the eye again, and found no change except that the reflex over the fovea was much less marked and the extravasations were somewhat lighter in color.

On January 20th she reported that she could see somewhat, and on examination she counted fingers at two feet. The fundus picture had not changed much, but the extravasations were apparently absorbing. The choroid around the fovea was of a deep red color.

The eyes remained in the condition here described for weeks without change. About the middle of February the girl had an attack of dysentery which confined her to her bed for several weeks. I saw her again on the first of March (six weeks after her first visit). The appearance of fundus had changed as follows: There is now in the centre of the macula a round spot of grayish color, about one-half of the diameter of disk in size. This is surrounded by a narrow zone of somewhat lighter color, and outside of this is a broad zone of deep red color. Just below the centre of the grayish area is a large blood-clot of bright red color in upper half, and of deep red in lower portion. The central scotoma is larger than before. She is no longer able to count fingers with this eye.

The treatment consisted of rest in bed for the first few weeks. I gave small doses of hydrarg. c. creta for several weeks, and afterward iodid of potassium. I applied leeches to the right temple, and ordered instillation of a ½ of 1% solution of atropin several times daily. Under this treatment the extravasations were gradually absorbed, and the greater part of the macular region became of lighter color. The choroid in this region was not visible. The retina became transparent again, and retinal vessels are seen over the yellowish-white patch.

During the past twenty-three years I have examined the eyes of this patient from time to time, but have not noted any further changes. She was married five or six years

ago, has two children, and is apparently in better health now than she was twenty years ago.

CASE 2.—Chorioretinitis hemorrhagica centralis.

Mrs. G., a well-developed woman, thirty-five years of age, married, has one child who has hip disease. She has always been in good health and is so now. Her urine is free from albumin and sugar. She has no symptoms of syphilis. She came to me because she had noticed for a week that the sight of her right eye was impaired. The left eye was normal.

On examination I found that the vision of the right eye was reduced to $\frac{5}{60}$. The V. F. was deficient downward. The eye was free from signs of inflammation; cornea, iris, lens, and vitreous were apparently normal. The fundus showed the following changes: In the choroid, above and outward of the apparently normal disk, were numerous small, round, pinkish spots and an irregular distribution of pigment. At the macula there were a few pinkish round spots, and here also the pigment was unequally distributed. The retina was quite clear and the retinal vessels were normal. I prescribed small doses of bichlorid of mercury, instillations of atropin, and leeches to the temple. Six days later I noticed a dark spot, not quite as large as the disk, at the macula, and in the retina in front of this dark area an extravasation of blood. In the inverted image the dark area was of a dark greenish color. There were no other changes in the retina.

I did not see the patient again till February 28, 1888 (fourteen months after her last visit). The eye now presented the following appearance: The disk is whitish, outline well defined. Just below fovea is white area, in size about two diameters of the disk; the margins of this opaque spot fade gradually into the red choroid. A short distance from the outer margin of this area there are a number of white lines running toward the periphery such as are seen occasionally in retinitis albuminurica. At the middle of the macula the retina is transparent, but under it are a number of dark spots with ill-defined outlines. Over the dark spots the retinal vessels are very distinct.

The patient came to me on this occasion because she had suffered from severe pain in the orbit and occiput for weeks. Has now pain in the left brow and left half of the upper part of the head. I was unable to discover an abnormal condition in the left eye, and attributed the pain to disease of the ethmoidal cells, for the treatment of which I sent her elsewhere.

Eight months after this last visit I saw her again. She

had had many attacks of amaurosis fugax. The attacks were followed by vomiting and severe headache (migraine). She asserted that she had had as many as three attacks in one day. I found the left eye as good as ever, but prescribed glasses for her presbyopia. In the right eye there was now seen, in addition to the changes above described, below the atrophic area, a pinkish spot, about one-half diameter of disk in size and surrounded by an almost black ring. The eye was blind. In 1891, I had another opportunity to examine this patient's eyes, but found no change from the last examination.

CASE 3.—Chorioretinitis hemorrhagica centralis.

W. W. W., a well-developed, healthy-looking girl, fifteen years of age, came to me March 23, 1903, with the statement that the vision of her right eye was much impaired for three weeks. I found that the left eye was perfectly normal in every respect and $V=\frac{6}{5}$. The right eye was blind from central scotoma. The ophthalmoscope showed the refraction to be emmetropic; a few floating opacities in the vitreous. The disk was normal as also were the retinal vessels. At the macula the choroid appeared of much darker color than elsewhere, and in the retina in front of this dark area was a light colored extravasation of blood. The extravasation had the form of a ring with a piece cut out above. Otherwise the retina was perfectly transparent.

A most thorough examination of this young woman by experienced physicians failed to discover disease of any other part of the body. The urine was free from albumin and sugar. I ordered leeches to the temple and gave iodid of potassium in small doses.

She returned a month later, when I found that the extravasation at the macula had almost entirely disappeared. The dark area beneath the retina had not changed in appearance. She was blind in this eye. Since then I have not seen the patient.

CASE 4.—Chorioretinitis hemorrhagica centralis in both eyes.

N. W., a tall, slender man, thirty-four years of age, was first seen by me in February, 1905. He stated that for the last four months objects seemed distorted to the left eye. The vision of the right eye was unimpaired.

On examination I found the exterior of the left eye to be entirely normal. The media were perfectly clear. There was no deposit on Descemet's membrane. The disk was normal and its outline distinct. The only change in the

fundus was as follows: In the inverted image there was seen at the macula a round spot about one-half the diameter of the disk in size, which was of a greenish color, and just above this spot was an extravasation of blood in the retina. The extravasation was of about the same size as the greenish spot. In the upright image the spot was of a darkish color. A retinal vessel passed over it. V = fingers near the eye. Central scotoma; V. F. not contracted. Tn. I requested his family physician to make a thorough examination of the patient's general condition, and he reported that he had valvular disease of the heart, but was otherwise in perfect condition. His urine was free from albumin and sugar.

I applied leeches to the temple and prescribed potassium iodid in small doses and instillations of atropin. He remained under my observation for a month, during which time the picture changed but little. His vision did not improve.

I did not see him again till June 30, 1908, more than two years after the preceding visit. He came now because the right eye had become impaired in sight. Six weeks before this visit he had first noticed distortion of objects in this eye, which was followed by a marked diminution of vision. He had been under treatment for this trouble elsewhere. I found the eye E. V = $\frac{6}{24}$; V. F. intact for white and colors. The external parts of the eye were perfectly normal. The media were clear; there was no deposit on Descemet's membrane. The disk was of normal color and its outline distinct. Adjoining the nasal margin there was an oblong patch of opaque fibres. The retina was quite transparent, except in the macular region where there were a number of small extravasations of bright red blood. Under the retina, in the centre of the macula, is a ring of darkish color, and in the ring a dark red spot. The diameter of the ring is about one-half the disk's diameter. In the inverted image the ring is of a distinctly dark green color. Retinal vessels pass over the darkish area. With the exception of a small white spot, without pigment on or around it, in the lower periphery of the fundus, there are no other changes in the eyeground.

At my request his family physician had a thorough examination made of the patient, and according to his report the man is free from disease, with the exception of the valvular disease of the heart. He suffers, however, from habitual constipation. He writes: "Mr. W.'s heart reveals a mitral regurgitant murmur and a pulmonary regurgitation. The heart's area of dulness on percussion is normal. No pericardial friction sound. His heart has since his last examination, about two years ago, improved very much;

at present there is no irregularity or heart block.' The urine was free from albumin and sugar. An examination of the blood was negative. A careful inquiry as to his previous history revealed the fact that he had had acute rheumatism seventeen years ago, and that valvular disease of the heart was first diagnosed twelve years ago. He has had no other disease and his family history threw no light on his personal condition. So far as we have been able to ascertain there is no case of tuberculosis among his relatives. The treatment consisted of small doses of calomel, subconjunctival injection of a 4% solution of sodium chlorid, leeching of temple, and rest for the eyes. Under this treatment the only change in the eyeground noticed was an increase in the number of extravasations in the retina. The extravasations were all small, except one which looked like a clot of the size of a pin's head. He complained that his vision was worse than when first seen. I discontinued the subconjunctival injection, but otherwise did not change the treatment. I used dionin in powder several times, but it failed to produce œdema of the conjunctiva. I advised him to go into the country and to abstain from all work with his eyes. He returned to me September 21st, when I noted the following changes: The extravasations in the retina were almost completely absorbed except a small one in the temporal half of the macula. There is now a black round spot at the side of the dark greenish ring which was formerly present, and around this is a narrow zone of a somewhat lighter color than the rest of the choroid. Retinal vessels pass over the dark round spot. $V=\frac{6}{24}$; V. F. intact for form and colors, but the latter are not as bright in the centre as a short distance from it. His general condition is good.

A careful examination of the left eye (the one first affected) shows V less than $\frac{6}{60}$. The ophthalmoscopic examination shows media perfectly clear. Optic disk pale. In region of macula is a grayish patch considerably larger than the disk, the lower margin of which is on a line with the middle of the disk and the nasal margin is about one and a half diameters of the disk from the optic papilla. The patch is of irregular form, and, in part, of a darker gray than the rest. The lower margin is fringed with the pigment. Retinal vessels, some quite large, pass over it. No choroidal vessels are visible. There are no other changes in the fundus.

On April 13, 1909, five months later, I saw him again. He stated that since the last visit he had suffered from an attack of acute rheumatism. This began in the heel of the foot and spread to ankle, knee, and hip joints of both limbs. He was treated for this by sweats. He is now free from

pains in his limbs. The condition of his eye is as follows: Right V=$\frac{3}{36}$. Small, absolute, central scotoma. Media perfectly clear, disk normal, retinal vessels usual size; at macula there is a dense, opaque, grayish spot surrounded by a narrow zone of very dark color. In size it is somewhat larger than the diameter of the disk. A retinal vessel is distinctly seen to cross the spot. Left: V=$\frac{6}{12}$; a small negative central scotoma and a large absolute paracentral scotoma. Ophthalmoscopic picture as before. He attributes the improvement in vision in this eye to the perspiration during the attack of rheumatism.

CASE 5.—Chorioretinitis hemorrhagica centralis in connection with syphilis.

The patient was a farmer, strong and muscular, thirty-five years of age. Up to March of this year his eyes had never been inflamed or given him any pain, and his vision had always been excellent. He was first seen by me on October 18, 1905. I learned from him that a year before he had had a primary syphilitic sore which was followed by secondary symptoms. Ten months before his visit he had had an acute inflammation of both eyes which had laid him up for five weeks. It was accompanied by much pain in the eyes and by impairment of vision. During the following three months the eyes were practically well and the vision fairly good, but since two months he had noticed a gradually increasing failure of vision in both eyes.

The examination made October 18th showed both eyes to be normal in appearance externally, with the exception of the presence of a few stretched posterior synechiæ. In both eyes the vitreous was full of floating opacities. The optic papillæ were flat and of normal color. In the left eye there was a streaked extravasation of blood in the macular region; R., M. 1 D. V=$\frac{6}{36}$; L., M. 1 D., movement of hand. I ordered inunctions of mercury, and gave potassium iodid, 10 grains three times daily.

January 1, 1906: M. 1 D. V=$\frac{6}{24}$; vitreous somewhat clearer. L., no central fixation, vitreous much clearer; extravasation at macula not much changed.

February 12th: V=$\frac{6}{12}$; L., V. as before, vitreous is now pretty clear; in upper part of macula is a deep red area, in size one-half of the disk's diameter; in region of macula lutea a dark green spot of about same size as the red one above. Has been taking large doses of iodid of potassium since last visit.

February 12, 1907: M. 1 D; V=$\frac{6}{8}$; L., V as before. The right eye is now nearly free from vitreous opacities. The left eye has still some floating opacities in the vitreous.

The macular region is now the seat of a dense grayish opacity, on which dark pigment is sprinkled irregularly.

February 1, 1908: M. 1 D., V=$\frac{6}{6}$; L., V as before. In both eyes the vitreous is now perfectly clear. The right eye shows normal eyeground. In the left eye the disk is surrounded by a narrow zone of atrophy of choroid. The region of the macula is occupied by an opaque grayish spot, nearly twice the size of the disk, and on it several small dots of pigment are deposited. No choroidal vessels are visible in this region. Otherwise the fundus shows no change from the normal.

The stretched posterior synechiæ found in both eyes at the first visit leaves no doubt that the inflammation of the eyes, from which he suffered six months before he came under my observation, was an iridocyclitis, and it is not improbable that the vitreous opacities which were present when I first saw him were the result of the inflammation. The hemorrhage found at macula of the left eye was undoubtedly very recent, and it was the failure of vision due to this that brought him to me. The dense opacities at the macula, which were seen as soon as the vitreous was clear enough for a satisfactory ophthalmoscopic examination, and the subsequent appearance of spots of pigment on it, leave no doubt in my mind that both the choroid and the retina were involved in the morbid process, and that this did not differ essentially from that observed in the other cases. Whether or not the syphilis can be held to be a cause of the disease I must leave undecided. In no other case of this disease that I have seen was the existence of syphilis admitted, or were there symptoms pointing to the presence of this disease.

Case 6.—Chorioretinitis hemorrhagica centralis of one eye, alleged to be due to traumatism.

M. B., a married woman, forty-five years of age, born in England, was first seen by me June 27, 1907. She consulted me with regard to the loss of vision of her left eye. Her family history was negative. She has always been in good health and has always had good vision in both eyes up to the present time, and so far as she can remember has never had any inflammation of her eyes. Since a few days she has noticed that the vision of her left eye is greatly impaired. Examination of the right eye showed it to be normal in every respect; with + 0.5 D. V=$\frac{6}{6}$. The left eye has vision equal to counting fingers at a few feet. It has a large, central scotoma. Tn. The eye is normal in its outer parts. The media are perfectly clear. The disk is normal in appearance and the retinal vessels are of normal

dimensions. At the macula the retina is hazy, and on it are a number of small, bright red extravasations; otherwise the retina seems normal; there are no extravasations elsewhere. The choroid underneath the hazy retina appears of darker color than elsewhere.

She was told to rest her eyes, and was given small doses of extract of ergot.

A few weeks later she was seen again. At this time was found, on examination by the indirect method, a dark green spot about one-half the breadth of the disk in diameter at the macula, and in front of the green spot and above and below it were a number of small, bright red extravasations. In the direct method the greenish spot appeared of a dark color.

Several months later the picture had changed. In place of the greenish spot there was now seen a spot somewhat larger, of a yellowish-white color and opaque; no choroidal vessels were visible on it.

Twenty-one months after her first visit the picture was about as last reported, except that the yellowish-white opaque spot is now of a darker color in its temporal third, and that there were now again a number of small, bright extravasations around the opaque yellowish-white spot. The extravasations seemed to be in the retina. There was now a large central absolute scotoma. The right eye remains normal in every respect.

On her last visit to me she inquired whether a blow on the eye could have caused the loss of vision, and intimated that she would bring a suit for damages for the loss of vision, if I could testify that a blow was the cause. She volunteered the information that shortly before she first consulted me she had been struck on the eye by the fist of some person. The fact that for twenty months she in no manner intimated that a traumatism might be the cause of her eye trouble, seems to me to make it quite doubtful that she actually was struck on the eye. The interest in this case lies in the fact that small retinal hemorrhages recurred a year after the disease had apparently ceased to be active.

THE DIFFERENTIATION OF THE DIPHTHERIA BACILLUS FROM ORGANISMS MORPHOLOGICALLY SIMILAR.[1]

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THE great frequency of diphtheria-like bacilli in the conjunctival sac has given the bacteriology of this group a particular interest to the ophthalmologist. There can be little doubt that the widespread lack of appreciation of the ease with which these diphtheria-like bacilli may be mistaken for the true bacillus of Klebs has led to inaccuracies in the statistics of diphtheria, more especially of ocular diphtheria. For instance, Dr. Verhoeff tells me that in the last nine years, among the numerous cases of conjunctivitis examined bacteriologically by him, in only two did he find true diphtheria bacilli, as shown by animal inoculation. Many cases thought to be diphtheria by the clinician were found to be due to other organisms. Moreover, in view of the increasing number of cases of serious serum disease reported, following the administration of antitoxin, a mistaken diagnosis of diphtheria must now be regarded as a more serious error than was formerly believed.

The literature bearing on the identification of the diphtheria bacillus is very extensive. A critical valuation of these investigations is rendered difficult by the confused state of the nomenclature and by the neglect of many writers to state the grounds on which they have identified the organisms studied. The term "pseudodiphtheria" furnishes a good

[1] Read before the American Ophthalmological Society, July 14–15, 1909. Presented by invitation.

example, for while it is applied by some writers to bacilli of the solid staining Hofmann type, others use it merely in the sense of "diphtheria-like." In the absence of a clear description of the organisms studied, the reader has to guess at the author's meaning and accept his diagnosis blindly. Investigations in which the morphological and cultural characters have been the sole standard of differentiation have given rise to a large part of the confusion which now obscures our knowledge of the biology of these bacilli. A detailed review of the literature is beyond the scope of this paper; the subject has been exhaustively treated in a recent monograph by Nuttall and Graham-Smith, *The Bacteriology of Diphtheria*, 1908 (1). Extensive bibliographies are also appended to papers by Goodman (2) and by Lewandowsky (3).

We are confronted at the outset by the question whether the diphtheria bacillus is to be considered simply one of a group of several true species, all more or less alike morphologically and culturally, or whether these supposed species in reality comprise simply variants of the true diphtheria bacillus. The question is of considerable practical importance, intimately concerned with our procedure regarding quarantine and prophylaxis.

At the present time, the evidence rather points toward the existence of distinct species. Instead of the diphtheria bacillus being the variable organism the other view would require, it has been shown to be fairly constant in its more important features. In careful studies made by Williams (4), Cobbett (5), and Graham-Smith (6) regarding the virulence of suspected organisms to laboratory animals, no intermediate degrees between complete virulence and total avirulence were found. T. Smith and Walker (7) found the toxin production to be fairly constant among the races of the diphtheria bacillus studied by them. The results of various observers who claim to have transformed pseudo-diphtheria bacilli into true diphtheria bacilli, and conversely [Hewlett and Knight (8), Richmond and Salter (9), and others], have failed to be confirmed in the hands of able investigators on repetition [Williams, Cobbett, Bergey (10)], and it has been my experience and that of others [Williams, Peters (11), Axenfeld (12), Escherich (13)] that bacilli of this group retain their origi-

nal characters after repeated transplantations for long periods. Williams has shown that strains of the diphtheria bacillus found in the throat retain their characters unchanged throughout the course of the disease to complete convalescence. It seems certain that these metamorphoses do not occur save under very artificial conditions, if at all, and it is probable that the so-called avirulent diphtheria bacilli reported from convalescent cases of faucial diphtheria are in reality nothing more than saprophytic organisms which begin to be discovered when the decreasing numbers of diphtheria bacilli cease to overwhelm them. By planting tubes of dextrin and saccharose media with equal quantities of a mixture of a race of B. diphtheriæ known to turn dextrin only, and an avirulent race known to turn saccharose only, I have repeatedly obtained acid fermentation in both tubes, showing that these species may grow well together. This symbiosis has been demonstrated in the body. Perhaps most significant is the failure that has attended attempts to render animals immune to diphtheria by the injection of pseudo-diphtheria bacilli or their products [Petrie (14), Spronk (15), Hamilton and Horton (16)] or to prevent the formation of lesions of these organisms by the use of diphtheria antitoxin. Pigs which have survived large doses of organisms, indistinguishable otherwise from B. diphtheriæ, have been found to die promptly from the injection of strains of known virulence.

Bacillus Diphtheriæ.—The morphology of this bacillus is most variable, not only in its change from the solid staining forms of the young growth to the bizarre involution forms of the older growths, but also in the general type of morphology, which may be the only one found in an epidemic. The various possible types of morphology have been carefully pictured in the now classic plates of Westbrook (17). These fall into three groups: granular, barred, and solid. Organisms of each form have been known to be virulent and to cause diphtheria. The important features of this organism, which have been generally accepted as constant, are the acid fermentation of glucose, the failure to ferment saccharose, virulence to the guinea-pig, and the elaboration of a specific soluble toxin. The value of these as diagnostic criteria will be discussed later.

The various diphtheria-like bacilli have been commonly divided into three classes: xerosis, pseudo-diphtheria (Hofmann), and the diphtheroid bacilli.

Xerosis.—The bacillus of Kutschbert and Neisser (18) is described as an avirulent bacillus, morphologically like the barred forms of the B. diphtheriæ, growing sparsely on blood-serum and found in the conjunctival sac. The term has come to be applied to all avirulent diphtheria-like bacilli found in the conjunctival sac having barred or granular protoplasm. These organisms may be recovered almost constantly from the secretions of normal or slightly inflamed eyes, and seem to be saprophytic, although they have been thought to cause a multitude of lesions, even neuropathic keratitis. These bacilli are often indistinguishable from true diphtheria bacilli except in virulence, and would seem to be identical with the so-called non-virulent diphtheria bacilli. Certainly these organisms have no etiological relation to the condition of xerosis, and the name is ill chosen.

Hofmann's Bacillus (19) ("Pseudodiphtheria Bacillus").—Bacilli corresponding to the D_2 and E_2 types of Westbrook have been the subject of many investigations, and there seems little doubt that avirulent bacilli of this type, which fail to ferment sugars, constitute a true species. It should be noted, however, that in old cultures this bacillus acquires involution forms indistinguishable from those of B. diphtheriæ, and, on the other hand, that virulent diphtheria bacilli as well as virulent diphtheroids and other pseudodiphtheria bacilli may present the solid staining protoplasm, even in fairly old cultures. The term "Hofmann" is used, also, as a convenient way of designating a certain type of morphology.

Diphtheroid Bacilli.—A general term, which has been used to cover many unrelated species, rarely met with in clinical work, which have been isolated from well persons, animals, foods, and lesions in many parts of the body to which their etiological relation was a matter of conjecture. The names given them by their discoverers give some idea of their characters: B. maculatus, coryzæ segmentosus, diphtheroid liquefaciens, etc. Most of them have some marked cultural characteristic, such as chromogenesis, liquefaction of media, adherent colonies, indol or spore production, but some might

be mistaken for diphtheria bacilli if morphology were depended upon for differentiation. Several observers have described diphtheroid bacilli which are fully virulent to the guinea-pig [Davis (20), Williams, Hamilton, and Horton]. That these are not identical with the diphtheria bacillus is shown by the fact that their pathogenicity is not counteracted by the antitoxin of diphtheria. Furthermore, Hamilton and Horton were able to produce a specific antitoxin, which counteracted their pathogenicity, but not that of the diphtheria bacillus. The non-virulent diphtheria bacilli and the so-called xerosis bacilli, as well as these virulent diphtheroids, seem logically to come under this heading. The exact significance of the diphtheroid bacilli as causes of disease remains to be worked out; most of them are saprophytic.

Differentiation.—Many modern investigators believe with Westbrook that they are able accurately to identify the diphtheria bacillus by its morphology, when this is "typical" (*i. e.*, Westbrook A, C, and D). It is obvious, however, that since the bacteriological examination is generally made only in cases suspected of diphtheria, the morphological diagnosis may usually be correct simply because the clinical diagnosis is more often correct than not. When the bacteriological finding is negative, its value is obviously great. The crucial question is, how often the morphological diagnosis is correct in cases which are either clinically atypical of diphtheria or in which the typical picture is produced by some other organism. In answer to this question, there are, unfortunately, no extensive statistics controlled by animal inoculation. It has been the experience in this hospital, however, that a morphological diagnosis of diphtheria is of little significance, especially in cases of conjunctivitis, in which pseudodiphtheria bacilli ("xerosis") are so universally present. It is well to bear in mind that faucial diphtheria may be closely simulated by inflammations due to staphylococci, streptococci, B. fusiformis, scrofula, and syphilis. Statistics collected from various sources show that in approximately 20% of all cases called diphtheria on clinical grounds, the diagnosis is not supported by the bacteriological findings, even when these are based on morphology alone. On the other hand, diphtheria bacilli have been found associated

with lesions quite unlike the classical picture and in well persons.

Attempts have been made to identify the diphtheria bacillus by means of serum reactions *in vitro*, but conclusive results have, thus far, not been obtained. The bacillus can, of course, be accurately identified by the determination of specific toxin production, but this is too cumbersome a process to be useful in general work. Of the various other means of differentiation suggested, two have continued to receive the attention of investigators: virulence and the fermentative action on carbohydrates. The fermentation test will be discussed later, here we will examine the validity of the test for virulence.

It has been generally accepted that non-virulent strains of the diphtheria bacillus exist. It seems certain, however, that if such is the case, they are at least much more rare than has been thought. To be virulent, the bacilli must be enabled by their environment to produce their soluble toxin. It is known that if the bacilli alone are injected subcutaneously, they are destroyed. In testing the virulence, therefore, it is necessary to inject with the organisms a quantity of the medium in which they grow well, and since toxin is not produced in the presence of more than a trace of a sugar fermented by the bacilli, this medium must be nearly sugar-free. The neglect of these precautions has been responsible, without doubt, for most of the non-virulent diphtheria bacilli reported. Williams, in the large series of cases studied by her, found that many strains, quite non-pathogenic when inoculated from broth, were highly toxic when inoculated from serum cultures or from ascitic broth, and it was rare that the bacilli isolated from typical cases of diphtheria failed to prove fully virulent. Williams, Park and Beebe (21), and Cobbett have been led by their experience to believe that avirulent strains are incapable of causing diphtheria, as, indeed, one would expect *a priori*. Hence, the identification of the diphtheria bacillus by its virulence is, in practice, the most satisfactory method, and would be so, even if the avirulent strains were not as rare as they are. The virulent diphtheroids referred to above are easily recognized by the fact that diphtheria antitoxin does not protect a guinea-pig from their pathogenic action. Unfortunately, the antitoxin

treatment of a case strongly suggestive of diphtheria cannot be delayed until the completion of the virulence test. Nevertheless, the virulence to both the normal and the immunized pig should be tested in all cases in which a positive diagnosis has been made, not only for the sake of abstract accuracy, but also to prevent unjust quarantine and as a guide to subsequent treatment. This becomes of especial importance in investigations intended for publication, since the literature is already burdened with inaccurate data.

The bacteriologist is usually called upon to determine simply whether the specimen submitted is the diphtheria bacillus or not, and hence arises the need of a general term to include all members of the group incapable of causing diphtheria. In spite of the pre-emption of the term "pseudodiphtheria" for the bacillus of Hofmann, it would seem the logical one for this class, and has been so used. In the absence of any well-established terminology, the writer suggests, tentatively, the following one for guidance in practical work:

Bacilli corresponding morphologically to any of Westbrook's types:

I. Virulent, virulence counteracted by antitoxin of diphtheria—*diphtheria bacillus*.

II. All others—*pseudodiphtheria bacilli*.

(*a*) Virulent, virulence not counteracted by diphtheria antitoxin—*virulent diphtheroid bacilli* (Ruediger's).

(*b*) Not virulent.

1. Solid staining protoplasm, not acid-producing—*Hofmann's bacillus*.
2. Granular and barred (rarely solid) protoplasm—*diphtheroid bacilli*, including "xerosis," non-virulent diphtheria and all other diphtheroid bacilli.

It will be seen that virulence is the basis of this scheme of classification; for reasons to be discussed later, the fermentative reactions have not been considered except as regards the Hofmann bacillus. The term "virulence" should be understood to include the production of local necrosis and œdema (in diphtheria, not present in the immunized pig). Hyperemia of the adrenals is almost constant in diphtheria.

It is evident that an accurate means of differentiation, more rapid and less expensive than animal inoculation, is urgently needed. Such a method seemed to have been found by A. Knapp (22) in his experiments on the action of xerosis, Hofmann's and diphtheria bacilli on various carbohydrates. Knapp found that he could differentiate the three by their action on dextrin and saccharose: his races of B. diphtheriæ always gave an acid fermentation with dextrin and never with saccharose, xerosis formed acid from saccharose only, while Hofmann's had no fermentative action. There were no variations and the reactions occurred in every case within forty-eight hours. It had been generally recognized that true diphtheria bacilli always fermented glucose and not saccharose, but so also did diphtheria-like organisms; apparently the fermentation of dextrin was peculiar to the diphtheria bacillus.

Knapp laid his results open to criticism by failing to mention the virulence of the races studied by him, and he very properly recognized the necessity of confirmatory work. This was done by Zinnser (23), who claimed to have confirmed Knapp's results in all important points, although he found five organisms, identical with the diphtheria bacillus in morphological and cultural characters, which yielded no toxin and which were not virulent to the guinea-pig, but still fermented dextrin and not saccharose, in the same way as did true diphtheria bacilli. His races of xerosis, while giving the same fermentative reactions as those of Knapp, did not do so until after a week's incubation. Hamilton and Horton and Graham-Smith state that they failed to confirm Knapp's results; the former, however, give no details of their work.

At the suggestion of Dr. F. H. Verhœff, the writer has undertaken to ascertain the value of the dextrin-saccharose fermentation test in the actual work of this hospital, where many cultures showing members of this group, recovered from lesions of doubtful etiology—notably from inflammatory conditions of the eye—are submitted for diagnosis. With the exception of four cultures of the diphtheria bacillus, the specimens were unselected, and were obtained from a wide variety of cases: membranous, purulent, and chronic conjunctivitis, keratitis, tenonitis, trachoma, and various anginas.

Knapp describes his technic as follows: "The medium is composed of beef serum 1 part, distilled water 3 parts, and is practically sugar-free. After heating to 100° C. for a short time to destroy the enzymes of the blood, 1% additions of the following sugars (in this work, saccharose and dextrin) were added. Finally, litmus solution (5% in water) is added in the proportion of 1%. The media are then tubed and sterilized at 100° C. for ten minutes on three successive days." This technic was followed except as regards the method of sterilizing. It was found that sterilization at 100° C. on three successive days did not insure complete sterility, and sterilization in the auto-clave was found to be more effective and convenient. It was found imperative to use fresh serum, since organisms that react well in fresh serum failed to do so when old serum was used.[1]

Smears were made from all sugar tubes after a week's incubation, to make sure that the organisms were growing well, and plates were made to exclude misleading reactions due to contaminations. No tubes were recorded as "no reaction" until they had been incubated over a week. Variations in the fermentative action of any specimen, as well as the fermentation of both sugars, could always be traced to contamination.[2] All specimens producing acid did not coagulate the media, coagulation being simply an expression of intense action. The use of an indicator in the medium, as proposed by Knapp for this work, is preferable to the estimation of acid-production by titration, since the test is purely a qualitative one.

The organisms studied consisted of 42 specimens, of which, according to the above scheme of classification, 12 were diphtheria bacilli and 30 pseudodiphtheria bacilli. The

[1] It is interesting to note in this connection that the organism Verhoeff (b), described by Zinnser (23) as having feeble fermentative action on dextrin, gave no reaction with us in a medium made from old serum, but when fresh serum was used, this strain always acted quickly and powerfully, even after cultivation for over a year on artificial media.

[2] For example, a specimen of xerosis bacilli, kindly sent us by Dr. Knapp, fermented saccharose at first, but after careful plating it turned neither, though tested repeatedly. The organism was received in ascitic agar, which is notoriously difficult to obtain quite sterile.

virulence of these organisms was counteracted by antitoxin in all cases in which it was tried, though unfortunately it was omitted in 5 cases in which the cultures had been lost before the work with antitoxin immunization was begun. In view of the source and character of these specimens, as well as of the rarity of the virulent diphtheroids, it seems improbable that these were not diphtheria bacilli, and since they gave the same fermentative reaction as the proved specimens they have not led to any false conclusions. Inoculations were made from emulsions of the colonies in the water of condensation of blood-serum tubes, which was found to contain only a trace of dextrose, as shown by Fehling's test, and since the bacilli grow well in this medium, it should be a favorable one from which to inoculate animals.

The fermentative reactions were as follows:

Virulent (B. diphtheriæ), 12: All fermented dextrin only, within forty-eight hours. Four of these were selected because of their known virulence, 7 were isolated from unselected cases of faucial diphtheria, and 1 from a case of membranous conjunctivitis.[1] One of these cases had the Hofmann type of morphology; the possibility of this having been one of the virulent diphtheroids was excluded by the fact that it did not affect the pig immunized with antitoxin.

Not virulent: Five fermented dextrin only within forty-eight hours, thus having the same fermentative action as true diphtheria bacilli. Of these, 2 were recovered from the nose, 1 from the throat, and 2 from the eye. All had granular or barred protoplasm. All patients recovered without the use of antitoxin. The clinical picture was not suggestive of diphtheria, except in one case.

Fourteen fermented saccharose only, the reaction occurring in from twenty-four hours to eight days, the average time being three and one-third days. These were isolated from the nose, throat, and eye. Two had the Hofmann morphology.

[1] This case of membranous conjunctivitis is regarded as of special significance, since the patient recovered without the aid of antitoxin and there were no serious constitutional symptoms. The bacilli isolated, nevertheless, had the usual high virulence of the diphtheria bacillus to the normal pig, while the pig immunized with antitoxin was unaffected.

Several of these were obtained from lesions resembling those of diphtheria.

Eleven fermented neither sugar. These were obtained from the eye and throat. One of them had the Hofmann morphology. Some of the cases were thought to be diphtheria, clinically.

In this series neither the morphology nor the cultural characters on blood-serum bore any constant relation to the fermentative action nor the virulence. Should further investigation show that the non-virulent dextrin-fermenting bacilli are attenuated diphtheria bacilli, the fermentation test would have an obvious, if only an academic, value. At present, however, aside from this power of fermenting dextrin, there is no more evidence in favor of this view than that any of the pseudodiphtheria bacilli are non-virulent diphtheria bacilli. In any case the question would become of practical importance only if it could be demonstrated either that the non-virulent strains are capable, under certain conditions, of regaining their virulence, or that, in spite of their harmlessness to the pig, these bacilli are in some degree pathogenic to man. As already pointed out, our present evidence does not support these possibilities.

The above results show that the fermentation of dextrin will not serve to distinguish the true diphtheria bacillus from the non-pathogenic species. In this series of 38 consecutive cases, five organisms were found which gave the same reaction as true diphtheria, or, in a series of 13 unselected specimens of dextrin-fermenting bacilli, over one-third were not virulent. These results, however, confirm Knapp's to this extent, that true diphtheria bacilli always fermented dextrin within forty-eight hours and never saccharose. It is then safe to say that if a given bacillus does not ferment dextrin it is not the B. diphtheriæ. In the routine of a general clinic, and especially of an ophthalmic clinic, this test will usually be decisive, for the true diphtheria bacilli and the dextrin-fermenting pseudo-diphtheria bacilli are relatively uncommon, compared with those which do not ferment dextrin.

Unfortunately, in actual practice, the fermentation test has not proved as useful as had been hoped. The ability of certain common organisms to ferment these sugars makes it

absolutely necessary to obtain the bacilli to be tested in absolutely pure culture. Such organisms are easily overlooked, especially in young cultures, and their complete elimination is often a tedious process. On the whole, this test consumes more time than animal inoculation, while it does not give as valuable information. Most often the contaminating organisms are harmless saprophytes or yeasts, combined with streptococci or staphylococci, which, although rendering the fermentation test valueless, do not affect the test for virulence, because the guinea-pig is remarkably resistant to moderate doses of them. A virulent strain rarely fails to kill within forty-eight hours, although four days is usually given as the longest period within which it may fail to kill.

Conclusions.—1. The diphtheria bacillus cannot be identified accurately by its morphology and its cultural characters alone.

2. True diphtheria bacilli always ferment dextrin within forty-eight hours and never saccharose. To this extent Knapp's results are confirmed. This reaction, however, is not distinctive of the virulent bacillus diphtheriæ, since it is also given by certain non-pathogenic organisms having the same morphology. Out of 13 unselected races which fermented dextrin, 5 were totally avirulent.

3. Since bacilli which fail to ferment dextrin are much more commonly encountered, the fermentation test would, in the majority of cases, be conclusive. Practically, it is of little value on account of the necessity of obtaining the bacilli in absolutely pure culture.

4. Animal inoculation is, at present, the only reliable practical method of identifying the diphtheria bacillus. To exclude the virulent diphtheroids, a guinea-pig immunized with diphtheria antitoxin must be inoculated also.

5. In practice, on account of the necessity of early treatment, the diagnosis of diphtheria should be based chiefly upon the clinical appearances and symptoms. Importance should be given to the microscopic examination only when it is negative. An erroneous early positive diagnosis of diphtheria is unavoidable in a large number of cases. To avoid unjustifiable quarantine, and as a guide to subsequent

treatment, animal inoculation should be carried out in all cases in which the diagnosis of diphtheria is made.

I wish to express my thanks to Dr. F. H. Verhoeff, not only for the material and facilities for this work, but also for helpful suggestions and criticism.

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IMPROVED APPARATUS FOR LOCALIZING FOREIGN BODIES IN THE EYEBALL BY THE ROENTGEN RAYS.[1]

By Dr. WILLIAM M. SWEET, Philadelphia.

(With 2 figures on Text-plate XXXIII. and 4 figures in the text.)

AT the meeting of this Society in 1887 I exhibited and described my first apparatus for the localization of foreign bodies in the eyeball and orbit. With some slight modifications the same general form of instrument has been used by me since that time in the examination of over 700 cases of foreign-body injuries. While the method of localization presents no great difficulties to the number of X-ray operators who have studied the principles and are using the apparatus, I have recognized for some time past, from experience in teaching student classes and in conversation with X-ray workers, that there was some trouble in knowing exactly what measurements were to be made from the radiographs and the manner of transferring them to the localization chart to find the lines of shadow of the foreign body at the two exposures. Therefore, I have had made the new form of apparatus here illustrated, which embodies exactly the same principles as the present localizer, but in which the construction of the instrument relieves the operator of the necessity of making measurements from the radiographs or of drawing any lines to represent the planes of shadow.

In the older form of apparatus the patient is in the recumbent posture, with the head firmly clamped, and the photographic plate to the side of the head corresponding to the injured eye. The two ball-pointed indicating rods, each

[1] Read before the American Ophthalmological Society, July 14–15, 1909.

parallel with the plate and at a definite distance apart, are adjusted until one of the balls is opposite the centre of the cornea of the injured eye and at a measured distance from it. Two negatives are made—one with the tube horizontal or nearly so with the plane of the two indicating rods, and the second plate at any distance below this plane.

The chart employed for localization contains circles to represent sections of the average normal eyeball of *24mm*, upon which are entered the positions occupied by the indicating balls at the time of making the two radiographs, one spot at the measured distance that the centre ball was opposite the centre of the cornea, and the other at the known distance the second ball was to the temporal side.

As the tube is placed anterior to the plane of the two corneal summits, and the rays pass obliquely through the head and the injured eye, the shadow of one of the balls is projected farther back on the plate than that of the other, the degree of displacement measuring the distance the tube is brought forward. Likewise the amount of separation of the shadows of the two indicating rods in the second exposure measures the degree to which the tube is carried below the horizontal plane of the eyeball. Measurement of these displacements of the indicating rods and balls upon the chart enables the operator easily to determine the precise spot from which the rays emanated at the time the exposures were made. After having determined the position of the anode of the tube at the two exposures, the operator has only to enter on his chart the several distances that the shadow of the foreign body on the two plates is above or below and posterior to the shadow of one of the balls, draw a line from each of these points to the known position of the tube, and these will indicate the planes of shadow of the foreign body at the two exposures. The point of crossing of the lines of shadow shows the position of the foreign body in reference to the centre of the cornea. The greatest difficulty experienced by the student in working the method was to remember the different measurements that were to be made from the plates, the position on the chart to which they were to be transcribed, and the direction the lines were to be drawn to

To Illustrate Dr. Sweet's Article on "Improved Apparatus for Localizing Foreign Bodies in the Eyeball by the Roentgen Rays."

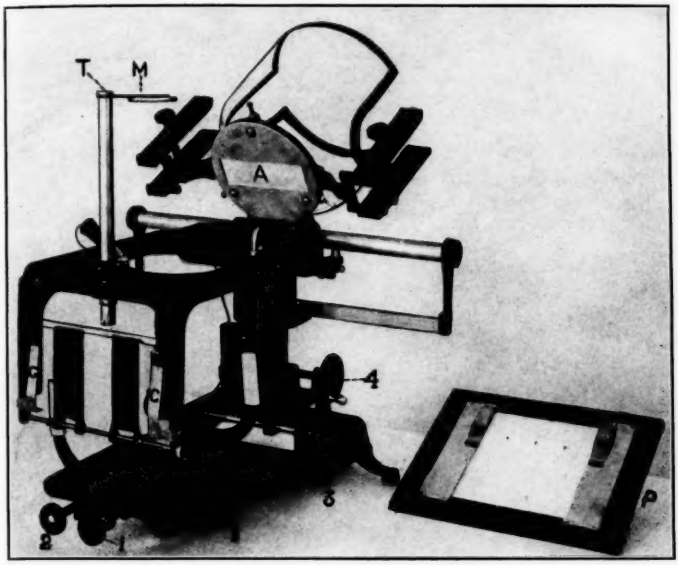

Fig. 1.

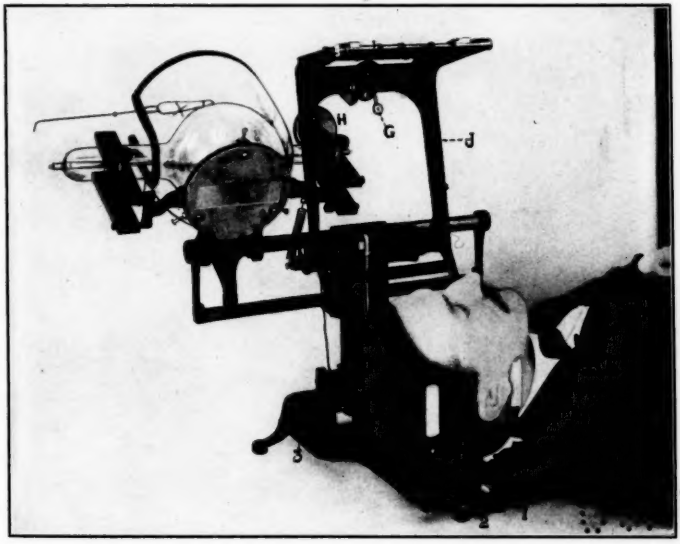

Fig. 2.

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show the planes of shadow of the indicating balls and the foreign body.

The New Localizer.—In the new apparatus the planes of shadow of the foreign body are accurately determined by the instrument without the necessity on the part of the operator of taking measurements from the plates or in drawing lines on the chart. The tube-holder, indicating ball, and plate-holder are upon a movable stage, and therefore preserve a known relation to each other, which does not vary. The angle of the rays with the eyeball and the distance of the tube from the plate are always the same, so that one indicator is sufficient, and this consists of a small steel ball supported in a ring of transparent celluloid. The setting of this ball opposite the centre of the cornea is made by means of adjusting screws conveniently placed on the frame of the instrument. Accuracy in the measurement of the distance of the indicating ball from the centre of the cornea is secured by means of a telescope and reflecting mirror. The mirror gives an image of a cross-wire and a lateral image of the cornea. Through the telescope the observer adjusts the instrument until the image of the cross-wire is in direct contact with the image of the summit of the cornea. (Fig. 3.) When the adjustment is

FIG. 3.—Image of cross-wire and cornea.

made, the indicating ball is exactly 10*mm* from the centre of the cornea. A miniature incandescent lamp, mounted in an adjustable shade, illuminates the side of the nose of the patient, insuring a well-lighted image of the cornea and cross-wire.

Instead of a ball of cotton or other object for fixation, as in the older method, a circular mirror is placed at a distance of 12 inches above the injured eye. The patient gazes in the mirror and sees a reflected image of the injured eye and the circular celluloid disk with the steel indicating ball in its

centre. After the ball has been adjusted to a point opposite the centre of the cornea of the injured eye, the patient by fixing the ball with the seeing eye prevents any movement of the eye during the exposures and holds the visual line of the injured eye parallel with the plate.

In order to shorten the time of making the radiographs and lessen the possibility of any movement of the patient or apparatus in changing plates, the two exposures in the new apparatus are made upon one plate, metallic shutters protecting those portions of the plate which are not to be exposed to the rays.

The tube-holder contains the usual cylindrical lead-glass shield for protecting the operator from the action of the rays, with the customary lead diaphragm. The central orifice of the diaphragm is covered wth aluminum, which offers little obstruction to the rays, but lessens the risk of any unfavorable action of the rays upon the patient and guards against possible damage to the eyes in the event of breakage of the tube. The tube-holder slides upon a graduated rod, and the first exposure is made with the indicator at zero, in which position the rays pass in a direction corresponding to the horizontal plane of the eyeball. The second exposure is made with the tube at its farthest point to the right or left of the first position, depending upon which eye is to be examined. The illustration (Fig. 1) gives a view of the complete apparatus.

Since the relative position of the tube in reference to the indicating ball and the photographic plate remains fixed and known, it is readily seen that the direction of the X-rays in passing through the eyeball must follow a definite course, which is always the same for the two separate exposures. It is, therefore, possible to indicate on the localization chart the direction of the rays at the two exposures, and this has been done in the chart, a copy of which is reproduced in Fig. 4, reduced in size one-half. Only those lines representing rays *2mm* apart are reproduced, but each line is drawn with the required amount of divergence to indicate the rays as coming from a point the distance of the tube from the photographic plate.

Method of Employing the New Localizer.—The apparatus is arranged as shown in Fig. 2. The patient lies with the head

on a platform of hard fibre, with a pillow beneath the shoulders and a small sand-bag under the head and neck. The upright supports for holding the head are now adjusted by means of

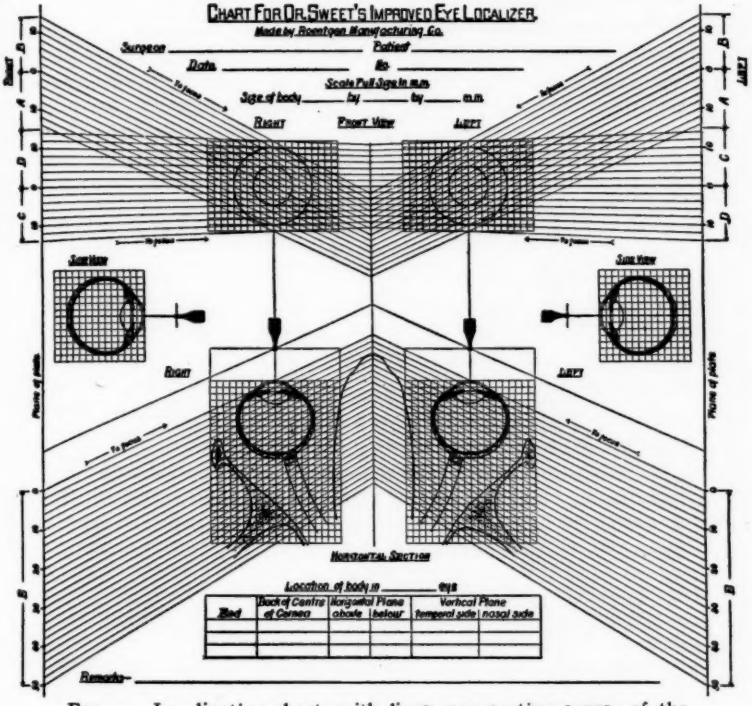

FIG. 4.—Localization chart, with lines representing course of the *X*-rays (one-half actual size).

the wheel 1, and the jointed part of the apparatus, J, containing the indicator is brought down in position. The indicating ball, G, is now roughly adjusted until it is opposite the centre of the cornea and about 12 or 15*mm* distant. The patient looks with the uninjured eye into the mirror, M, and fixes upon the iris or cornea of the injured eye, or, better, upon the indicating ball in the centre of the celluloid disk. The indicating ball is now carefully adjusted directly over the corneal centre by means of the wheels 2 and 3, and the

correctness of the position verified by observation through an opening in the mirror, M. The operator then adjusts the light of the small electric lamp so that the side of the nose next the injured eye is illuminated, but the light is not thrown into the eye. With this area lighted it is possible to see clearly through the telescope, T, when the cross-wire is exactly tangent with the summit of the cornea. The movement necessary to secure this position of the wire is made by means of the adjusting wheel 4. When the image of the cross-wire touches the image of the corneal summit, the indicating ball is exactly 10*mm* from the eyeball.

The photographic plate is inserted beneath the spring clips, C C, the shutters, S S, moved so that the centre area is open (Fig. 1), and the tube-holder adjusted to the zero point on the sliding scale. The current is turned on, and one exposure made. The tube-carriage is then moved to the limit of the sliding rod, always in the direction of the chin of the recumbent patient (to the end marked R if the radiographs are made of the right eye, and to L if of the left eye). The upper shutter is moved to cover the exposed central portion of the plate and uncover the upper unexposed portion. The current is again turned on and the second exposure made. The time of exposure for the second picture should be about one and a half times that of the first, to allow for the increased distance of the tube from the eye.

After the plate is developed, it is placed in the frame P (Fig. 1), containing the key-plate or focal coördinates (Fig. 5), with the film side of the radiograph next to the key-plate. The radiograph is moved until the shadow of the indicating ball of the first exposure is in apposition with the middle ball on the key-plate and the heavy horizontal line of the radiograph parallel with the horizontal line on the plate. Holding the frame to the light, there is noted the position occupied by the shadow of the foreign body with respect to the vertical lines of "C" and "D." A reading is made of the line or lines which pass through the body, and this is transferred to the corresponding lines of the "C" or "D" scale of the chart, to the right or left side, depending on which eye is under examination. Without moving the plate, the "E" reading is similarly made and transferred to the chart. To take the "A" or

"B" reading, the plate is shifted slightly until the image of the indicating ball on the second exposure coincides with the "Right" or "Left" ball of the vertical coördinates "A" or "B." The line or lines of the "A" or "B" coördinates which cross the shadow of the body are noted and indicated on the "A" or "B" lines of the chart. The horizontal coördinate "E" should be the same in both readings. If the focus point on the anode of the tube was accurately set by the cross-lines

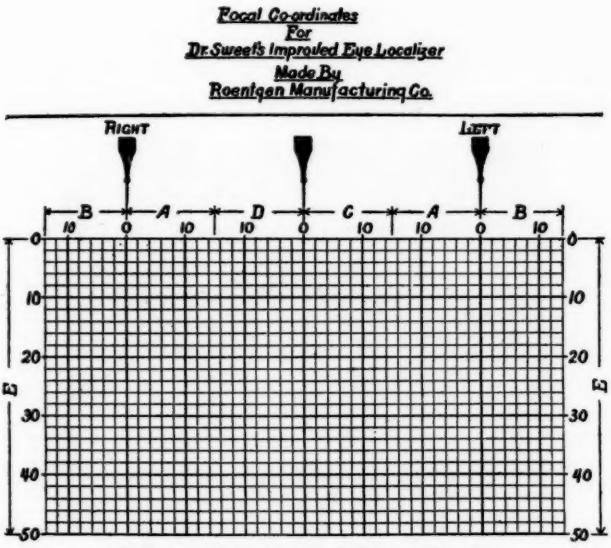

FIG. 5.—Plate showing focal coördinates (three-fourths actual size).

on the lead-glass shield of the tube-holder, the images of the indicating ball on the plate will coincide simultaneously with those on the transparent key-plate, and it will then not be necessary to reset the plate to read the position of the "A" and "B" coördinates.

After the three readings have been transferred to the chart, the point of crossing of the "A" or "B" and the "C" or "D" lines is found, which gives the location of the foreign body in reference to the front view of the eyeball, indicating its

situation above or below the centre of the cornea and to the nasal or temporal side of the vertical plane. Where a vertical line from this point crosses the "E" reading on the horizontal section of the globe it gives the depth of the body in the eyeball or orbit. In bodies of large size both ends should be localized to give the position in which the body rests in the globe. The situation of the body on the side view is determined by transferring its measured depth from the horizontal section and its distance above or below the horizontal plane from the front-view localization.

The new apparatus is based upon the same general principles as was the old, but its mechanical features eliminate some of the errors that may occur in the use of the present

FIG. 6.—Radiograph of foreign body in eye (three-fourths actual size).

instrument through carelessness of the operator in making the measurements and transferring them to the chart. The inexperienced worker in eye localization is also relieved of the necessity of studying out the position of the tube and the direction of the lines of shadow at the two exposures. The construction of the new apparatus insures that these factors are positively determined and recorded. The accuracy of the localization depends only upon the care with which the operator adjusts the indicating ball opposite the centre of the

cornea and at the definite and fixed distance from it. After the exposures are made and the plate developed, the determination of the situation of the foreign body is simply a question of reading from a key-plate and transcribing these readings to the chart.

I am indebted to the Roentgen Manufacturing Company, of Philadelphia, for the excellent manner in which the details of construction of the apparatus have been worked out.

THE SIGNIFICANCE AND TREATMENT OF TRAUMATIC PROLAPSE OF THE IRIS.[1]

By Dr. E. GRUENING, New York.

THE time-worn topic, traumatic prolapse of the iris, discloses some interesting features which may be discussed with benefit. Compared with perforating wounds of the sclera, the corneal injuries with prolapse of the iris, with or without implication of the lens, constitute a mild form of traumatism. The very fact that the iris has prolapsed is in itself presumptive evidence that we have not to deal with a retained foreign body. The final outcome is apt to be sufficiently favorable, no matter which of the many treatments recommended we employ.

Conservatism is not indicated in traumatic prolapse of the iris. The healing of the eye with adherent leucoma may be a sufficiently good result for prolapse of the iris due to corneal perforation complicated with a blennorrhoic condition of the conjunctiva, but should not be considered satisfactory in traumatic prolapse.

The ideal treatment would be the replacement of the iris, and this can be accomplished in many cases; it is, however, one of the most hazardous modes of procedure, because the prolapsed iris is no longer aseptic, and may infect the interior of the eyeball. This is not a theoretical objection. I have lost one eye in this manner.

Abscission, or snipping off, or any of the other methods which leave the iris between the lips of the wound, are not to be recommended, because the synechia is not disposed of.

Excision is pre-eminently the correct method. Leber has

[1] Prepared for the American Ophthalmological Society, July 14–15, 1909.

dwelt upon this matter at length, and has described the steps of this operation. It is well known to us. I have practised this method many years, and often succeed in making a clean iridectomy by pulling the iris through the wound in such a manner that the perfect result of an iridectomy is obtained, with the pillars of the iris well placed in the anterior chamber.

At times, however, the lens-capsule or a tag of the iris still remains adherent to the corneal wound, and in such cases, after the re-establishment of the anterior chamber and firm union of the wound, the use of Knapp's needle-knife for the cutting of the adhesions has yielded very satisfactory results. In introducing the knife into the anterior chamber, the shaft of the knife closes the wound, the anterior chamber is not emptied, and even in cases of broad adhesion the iris or capsule of the lens may be readily severed. For the sake of illustration I shall report one case of the many which I have treated with unvarying felicitous results during the past year.

Report of Case Transcribed from the Housebook of the New York Eye and Ear Infirmary.

F. M., aged nine, was admitted to the New York Eye and Ear Infirmary on March 17, 1909. Two days ago the patient was struck in the right eye by a stone. There is a perforating wound of the cornea with incarcerated iris and cataractous lens. The corneal wound extends from the nasal side of the corneo-scleral junction to the centre of the cornea in its horizontal meridian. The iris is wedged between the lips of the wound throughout its whole extent, but does not bulge beyond its level. The anterior chamber is shallow.

Atropin instilled dilates the temporal part of the pupil sufficiently to enable me to recognize the opacity of the lens. An incision is now made at the sclero-corneal junction, through the adherent iris, which is then seized with iris-forceps and removed. No lens-substance can be evacuated. On the following day, March 18th, the anterior chamber is restored, the pillars of the iris are free, the wound is clean, but the lens-capsule is incarcerated in the corneal wound.

March 26th.—This strip of adherent capsule is severed by the needle-knife.

March 29th.—Fine thread of capsule still adheres to the

corneal wound. This also is severed within the anterior chamber without loss of aqueous.

April 9th.—An ordinary discission is practised on the remaining lens-substance.

A few days later the patient is discharged with a quiet eye and without an anterior synechia, therefore lacking any element of remote complications.

Some authors do consider a resulting adherent leucoma a satisfactory outcome of such a case, but I am convinced that we can very often obtain more perfect results by removing the adhesions. In cataract operations, where we make the sclero-corneal incision, a resulting anterior synechia would be considered a fault of technique; similarly, we should remove existing adhesions in accidental injuries.

That such adhesions form a source of danger is known to us all. I have myself observed and described a case of sympathetic ophthalmia as a result of adherent leucoma.[1] More frequently I have seen cases of chronic or acute glaucoma under these conditions.

My purpose is to show that we can obtain better results by the combination of excision, iridectomy, and, where indicated, the use of the needle-knife. The end-stage of the injury should constitute a mere corneal scar, uncomplicated by either iridic or capsular adhesions. This should be our aim, and it can be accomplished in a very great number of cases.

[1] *N. Y. Eye and Ear Infirmary Reports*, Jan., 1899.

REPORT OF THE PROCEEDINGS OF THE SECTION ON OPHTHALMOLOGY OF THE BRITISH MEDICAL ASSOCIATION.

By Mr. C. DEVEREUX MARSHALL.

MEETING OF WEDNESDAY, JULY 28, 1909. DR. J. WALTON BROWN, PRESIDENT, IN THE CHAIR.

In his opening address Dr. Walton Brown expressed the honor he felt in occupying the Presidential Chair. On behalf of the Ulster Branch he extended a hearty welcome to all attending.

He referred in sympathetic terms to the loss that ophthalmology has suffered by the death of the late President of the Association, Mr. Simeon Snell, and mentioned the chief subjects in which he had left his name.

It was now a quarter of a century since the Association had met in Belfast, and at that time the President was the late Dr. W. A. McKeown who gave to the world the intra-capsular and intra-lenticular method of dealing with immature cataracts. He also was the first man in Great Britain, if not in the world, to introduce a magnet into the eyeball for the extraction of particles of steel. Through his exertions, the Royal University, of which he was a Senator, was the first examining body in Great Britain to insist upon a special examination in ophthalmology for the degree of M. B. He (Dr. Brown) entered a plea that ophthalmic surgeons should have a prolonged training in medicine and surgery before confining their entire attention to ophthalmic surgery. As the nose and eye were so closely connected, the ophthalmic surgeon should study both organs. He mentioned the names of some of the old leading surgeons in Belfast who were also

known as ophthalmologists, and then pointed out that years ago Ireland was well to the front in many points appertaining to ophthalmic work. In the midst of so much that was new, people were apt to forget some of the very useful old remedies. He then called upon Dr. Freeland Fergus to open the first discussion.

Discussion on **eye injuries in relation to the Workmen's Compensation Act.**

Dr. FREELAND FERGUS (Glasgow) first of all thanked the Section for the honor it had done him in asking him to open this important discussion, which would have fallen to the lot of the late President, Mr. Simeon Snell, had he still been with us. The problem of compensation for eye injuries he considered all but insoluble. Attempts had been made both here and abroad to devise mathematical formulæ, expressive of what might be called visual efficiency, and Berry and Percival had written interesting articles on the subject, and these observers were both well qualified to do so from their acquaintance with mathematics and ophthalmology. He contended that it was impossible, however, to reduce to a mathematical formula anything involving human action based on individual human volition and intelligence. What one man could do well with either very defective vision or no sight at all, another would be unable to do without full range of vision, and it would be quite unfair to contend that what one blind person could do, another was capable of doing also; intelligence came in in all these instances. Then again there were the two large groups of individuals such as the lawyer, watchmaker, doctor, etc., for whom the best sight was essential, while in the other group are those of the manual or laboring class for whom less good vision was sufficient. The enquiry should rather go along the lines of actuarial investigation. There should be a collection of voluminous statistics from which average results from different classes of occupations could be derived. He thought there was scarcely any work below ground which could not be undertaken by a man with only one eye, and he had known men carry out such work well when the remaining eye had only $\frac{1}{10}$ of normal vision; thus, a man who had an ordinary light sense, and who also had good alignment, could perform almost any kind of

manual work. So long as the work was one of alignment and absolute, as distinguished from relative, distance, the thing was quite simple. There were factors, other than convergence, that helped a man in the estimations of distances; accommodation was probably one, and the size of the retinal image was another. People so soon become accustomed to seeing things with one eye.

There were, however, other subsidiary questions. If a man did require binocular vision for his work, there was the question of his changing his occupation altogether, and this might be impossible. Secondly, there was the fact that a man wishing to return to his occupation had a much diminished chance of getting employment. In such cases liberal compensation should be allowed. A middle-aged person might be said to be incapable, as a rule, of learning a new trade, and he might thus be permanently disabled. Since the passing of the Act, elderly people or persons with any physical defect, or when employment would involve undue risk, had often been thrown out of employment. It was a mere matter of time before all insurance companies would insist on all persons insured by them being sound both in body and limb. Already the Act had compelled many men who were perfectly capable of earning their own living, and who were more than willing to do it, to join the ranks of the unemployed, and before long probably a third of the entire workers in this country would be thrown out of work, and then the wretchedness and destitution which now existed would be greatly multiplied. He suggested that for such people there should be a possibility of a contracting-out clause. The Act aimed at the prevention of destitution during the incapacity of the bread-winner, but he feared that it had already caused infinitely more destitution than it had prevented; already it had thrown many industrious people out of employment, and this was only the commencement of the tale of woe.

The Act was looked upon, by some, as a means of getting money for any trifling injury, and the most was made of such. The Act was never intended as a sort of accident insurance. It had already caused much malingering and a certain amount of neurasthenia. No wonder insurance premiums had become much increased. He knew that for one class of workers it

had increased from 2 shillings to 30 shillings per hundred. The cases should be referred to competent medical men and not to judges and juries who had no technical knowledge. The medical judge should be neither attached to one side nor the other, so that he could look upon the case in an unbiassed manner. A referee for one district should reside in another.

Dr. CECIL SHAW (Belfast) dealt with the unsatisfactory working of the Workmen's Compensation Act with regard to compensation for the loss of an eye, in which, according to the Act, no compensation was given, but only for partial or total incapacity for work. In the great majority of cases a man with one eye was, after a time, quite as good as he was before with two, but the true injury lay in the much greater liability a man with one eye had for total blindness should accident or disease happen to the other. Owing to this, many people refused to employ a one-eyed man at all. He knew of a case in which a mistress at once discharged a servant on finding out that she had only one eye, and she could not get another place on this account. She brought an action but lost it, as it was found she was quite capable of performing her duties after the loss of the eye. He thought that a far better plan would be for a fixed sum to be paid irrespective of all theories or statements about a man's capacity for work.

Mr. W. H. BRAILEY (Hove) said that modern legislation tended to make the employer liable for any injury taking place during work, without considering the fact that the man might, by his carelessness, be entirely responsible for the accident. Thus he knew of a man with 20 D of myopia who got a detachment of the retina following a slight injury, and for this he got liberal compensation. A strict medical examination before employment should be instituted, and if so, all those suffering from any injury or disease would be excluded from employment altogether. He did not consider that a man with only one eye could be as employable as one who had two, for he must be more liable to accidents, not only to the other eye, but to his body generally. He agreed with Dr. Fergus that the workman should be allowed to contract out of the Act, if possible insuring himself at a necessarily higher premium.

Dr. ARTHUR GREEN (Norwich) was inclined to agree that a one-eyed man was at no very great disadvantage (except in a few special occupations) from one with two eyes from a wage-earning point of view, provided the remaining eye had good vision. Many people had little or no sense of perspective, and the loss such a man would suffer after one eye was gone would only be the loss of size of his field. The possibility of the individual to obtain work should be carefully considered in all legislation.

Mr. JOHNSON TAYLOR (Norwich) asked if it was considered that a one-eyed middle-aged man would be capable of working as a billiard marker, or player (professional).

Mr. BISHOP HARMAN (London) was surprised to find that previous speakers exhibited such indifference to the loss of binocular or stereoscopic vision. He thought that in many employments such as in bricklaying, the sense of the position of things was immeasurably better in a two- than in a one-eyed man. Many people attained considerable perfection with one eye only, but how much better would they have been had they retained both. Then there was the point of view of loss of nerve power, and the increased risk there was to one who was employed in machine shops. Those with one eye only were seriously handicapped in getting work. Insurance policies for domestic servants excluded one-eyed persons from the current rates. It certainly was right to urge employers to get their people examined, and thus save many disputes afterwards. Such cases should be removed from the grasp of the unprincipled lawyer who was responsible for much loss of time and money, and the development of much bitterness. The doctor's report should be the data for the awarding of compensation.

Dr. BERRY (Edinburgh) considered that a difference as regards compensation should be made for the first six months after the accident.

Mr. WALLACE HENRY (Leicester) said that a consultation between the medical men engaged by the workmen and the insurance companies, as to the facts of the case in dispute, would prevent unnecessary legal controversy. He also supported Dr. Cecil Shaw in the opinion that the difficulty of obtaining work after loss of an eye was nearly as important

a factor in considering compensation as the partial loss of sight.

Professor FUCHS (Vienna) said that it was not a purely scientific question. Most one-eyed men were capable of work, but the difficulty lay in the conflict of interests of employer and servant. The risk was greater for the employer. In Germany and Austria no personal responsibility lay with the employer to provide compensation. There was a fund to which all employers subscribed by way of insurance; 90% was provided by the masters and 10% by the men, and the fund was administered by their own judges at the instance of their own medical men, and the sole idea was that of doing justice to the injured man.

Dr. BROWN summed the matter up briefly, and Dr. FREELAND FERGUS replied.

Dr. JAMES HINSHELWOOD (Glasgow) described the case of a man aged thirty-six who was first seen in May, 1906, complaining of defective vision in the right eye, which he had noticed for two and one-half years, but had gradually become worse. Nothing was noticed externally, nor was there any pain or discomfort. The eye appeared normal, and so was the tension; the central area of the field was abolished, but he could count fingers. At one area near the posterior pole, and involving the macular region, the retina was slightly raised.

In May, 1908, two years later, his vision had become worse and he could no longer count fingers. The detachment was more marked, and could be seen with a + 6 lens; the external appearance and the tension were normal. A tumor was now diagnosed, but the patient refused excision. The external appearance and the tension were much the same in February, 1909, but the ophthalmoscopic appearance had changed, and the growth could be seen with a + 10 lens. The eye was enucleated a month later, and was then found to contain a large leucosarcoma with spindle cells, but it had not involved the optic nerve or sclerotic. Leucosarcomata were much less common than the melanotic variety. The points of interest were the facts that the tension was not raised, and that the growth had been present for so long a time.

The clinical lesson which this case gave was the long period of increasing visual defect amounting to five and one half

years without elevation of tension and without pain or any other subjective symptom.

Mr. DEVEREUX MARSHALL pointed out that he considered that the tension in tumor cases was a very variable symptom, and one to which he paid but little diagnostic importance. It depended upon closure of the angle of the anterior chamber, and was altogether independent of the size of the growth. Increased tension was far more frequently seen in cases in which the tumor was at the posterior part of the eye, and far less frequently seen if the growth involved the ciliary body, and in these latter cases the tension was frequently normal or below normal.

Dr. ANDREW LITTLE (Bradford) mentioned a case of twenty-five years' duration. He found a white tumor involving the lower part of the ciliary body and anterior part of the choroid of the right side. An iridectomy had been done on a previous occasion, twenty-five years ago, at Manchester, for sarcoma of the iris, and the histological examination proved the diagnosis to be correct.

Dr. R. A. REEVE (Toronto) raised the question as to whether, in view of our knowledge or want of knowledge of the genesis of sarcomata in the cases quoted by Dr. Little when apparently the growth recurred twenty-five years later, the second growth was not a new one altogether, and it would not be irrational to suppose the second came from an altogether different focus with a much longer period of latency.

Professor Sir VICTOR HORSLEY (London) read a paper on the **diagnostic value of optic neuritis in cases of cerebral tumor,** and he contended that the almost invariable rule was that the neuritis was most marked on the side of the lesion.

Mr. LESLIE PATON said that undoubtedly cases occurred in which optic neuritis was greater on the side away from the tumor. A certain number of cases might be explained, *e. g.*, cases where there was direct pressure by the tumor on a nerve of one side, preventing the development of neuritis in that eye, a case in which through the tumor being on one side the main pressure effects were on the other, but when the exceptions were allowed for, there still remained a large number of cases which could not be explained away, a number too large to take it as a rule that the neuritis was greater in the

eye on the same side as the tumor. In at least 50% of the cases the neuritis was equal in the two eyes.

Dr. HINSHELWOOD (Glasgow) thought it was of the utmost importance to know on which side the lesion was, and he narrated the case of a young lady who had suffered from a discharge from both ears with headache for some time; a few days before he saw her she had become semicomatose. The left eye had mild neuritis, and the right eye only a slight hyperæmia of the disk. The diagnosis lay between a general meningitis or a localized cerebral abscess, and if the latter, on which side was it? The patient then developed Jacksonian epilepsy commencing in the face, and confined to the right side, and this confirmed the result of the ophthalmoscopic examination, which, according to Sir Victor Horsley, pointed to the lesion being on the left side. The patient was operated upon within twenty-four hours, and an abscess was found in the left temporo-sphenoidal lobe, pressing upon the motor area above. Such a case conclusively showed how valuable it was to know on which side the lesion existed.

MEETING OF THURSDAY, JULY 29, 1909.

Professor ERNST FUCHS (Vienna) read a paper on **Malformation of the cornea in cases of inherited syphilis.**

He first of all paid high tribute to the work of Sir Jonathan Hutchinson on this subject. He (Professor Fuchs) had noticed that in some cases of interstitial keratitis the cornea assumed the shape of a vertical ellipse, whereas the normal cornea when seen from behind after dissection was round; from the front it appeared to be horizontally oval, due to the non-transparent conjunctival limbus encroaching upon the cornea more at the upper and lower margin than at the sides, the oval of the normal cornea being thus apparent only. In the case of a vertically oval cornea the form was real and was independent of the limbus. During the last year he had collected 28 cases in which either one or both corneæ were obviously vertically oval; of these, 20 were females, 17 had interstitial keratitis, 5 cases had chronic iritis, one had unilateral congenital cataract, and 2 had corneal opacities probably due to strumous keratitis. The remaining 6 were in old

people in whom the evidence of the disease was very much masked, consequently Professor Fuchs used only the first 22 cases. In 8 the evidence of inherited syphilis was marked, 8 cases had some indication of it, and 6 showed no symptoms of the disease. All had had interstitial keratitis. Of 50 fresh cases of interstitial keratitis seen last year a small number showed the malformed cornea, and, in addition, 14 cases with oval cornea showed no sign of past or present keratitis. He concluded that an oval cornea was many times more frequent in cases of inherited syphilis, and especially in those followed by interstitial keratitis, than in the bulk of other patients, but he was far from believing that an oval cornea was always the result of congenital syphilis.

Oval corneæ were also found in cases of coloboma of the iris and in other congenital abnormalities, but these he altogether excluded; these were usually present in both eyes, but in 6 out of the 28 syphilitic cases it was one-sided only. In most cases it gave rise to inverse astigmatism.

Mr. TREACHER COLLINS asked Professor Fuchs whether he had examined any of these oval corneæ anatomically, so as to prove whether the appearance was due to encroachment of the limbus at the sides, or to a true alteration in shape of the cornea itself. Professor Fuchs said that the alteration in his cases was real.

The visual acuity of school children. By Mr. W. B. INGLIS POLLOCK, Glasgow.

The statistics of the visual acuity of school children contained in the annual reports of the medical officers to the educational authorities throughout the country, presented great variation. The returns from a School Board in Scotland showed the lowest percentage of defective vision in one school to be 6.5, while the highest was 77.8. The figure for the 1,196,504 school children in the provided and non-provided schools of the London County Council during the last two years and nine months was 10.39 per cent. The author's own percentage was 11.65. These variations depended upon the method of compiling statistics or the definition of defective vision which had been adopted. In the former case it was not correct to base the classification upon the worse eye. It was not true that binocular vision was equal to the worse eye. It

was equal to, or often better than, the vision of the good eye. The most practical method was adopted by the London County Council Schools, which had been in use for eight years. It had been said that the vision of school children was not equal to the average adult visual acuity. This question required large statistics and should be based upon the number of eyes examined. For young children, the test-types should be the outline figures of common objects. Exaggeration in the easily comprehended subject of the visual acuity of school children would bring the whole question of the medical inspection of school children into contempt and discredit.

Mr. BISHOP HARMAN (London) said that in his large experience of school eye-work in London he had come to the conclusion that the practice of taking the vision of each eye separately in children caused a futile waste of time. He had found that the alleged error in testing with eyes together was so small as to be negligible. Dr. Inglis Pollock had not said what eye conditions were responsible for the defect of vision. He (Mr. Harman) had tabulated the results of the examination of 1100 London children with the result that the defect in 43% was found to be due to simple hypermetropia, 29% to H. astigmatism, and that both of them were practically natural states; 7% had mixed astigmatism, 9% myopia, 10% mixed astigmatism, and 2% odd eyes. This meant that 25% of the defective vision was due to myopia in some form but as these children represented barely $\frac{1}{10}$ of the school children, the amount of myopia in children was no more than 25%, and probably less, as the tests caught all the myopes, but not the hypermetropes with good accommodation.

Dr. R. A. REEVE (Toronto) said he had been struck with the number of cases of asthenopia from hypermetropia and hypermetropic astigmatism in people from 16–24 years of age who had not previously suffered from symptoms of eye-strain.

Mr. INGLIS POLLOCK, in reply, said that defective vision in school children remained practically at 10%, but the condition producing the defect varied at different ages. In the early years it was mainly hypermetropia and H. astigmatism and external conditions of the eye; later, myopia played a

much more important part. He thought the reason why Mr. Reeve noticed that young children did not complain much of asthenopia, was due to the eyes developing myopia. He had, however, seen these symptoms in young children and these mostly had hypermetropic astigmatism.

Dr. FREELAND FERGUS (Glasgow) read a paper on **Operations for glaucoma by trephining.**

In describing the operation he practised, he said that it was essentially a modification of that of Lagrange, and that his modification stood or fell with the success of that of Lagrange. From the clinical standpoint he thought that sclerotomy was perhaps as reliable as iridectomy, and was easier to perform, and it also had some obvious advantages, in that it was painless and needed no anæsthetic, which was important in many glaucoma patients, whose hearts and vessels are frequently diseased. Then there was no danger of injuring the lens, which could easily be done if a keratome were used. The risk of septic infection was much lessened, as the wound was at once covered by a conjunctival flap.

The operation was quite simple. A large conjunctival flap was dissected up to the corneo-scleral junction, then the trephine was used to remove a piece of sclera as near to the cornea as possible. The point of a fine iris repositor was next passed from the scleral opening right into the anterior chamber, and lastly the conjunctival flap was replaced and stitched back into position.

Dr. ANDREW LITTLE (Bradford) pointed out that in this operation there was danger of septic infection at any remote period of time. He had had to remove eyes for general infection years after what were admitted to be cases of successful filtration cicatrices.

Dr. G. A. BERRY (Edinburgh) thought the operation would be very useful in forming a cystoid cicatrix, but it would not be required if iridectomy were at all likely to be successful.

Mr. TREACHER COLLINS (London) pointed out that Dr. Freeland Fergus did two things: (1) The removal of a piece of sclera and (2) the breaking through of the ligamentum pectinatum *i. e.*, a cyclodialysis, and in estimating the result these two factors must be taken into consideration; the first

aimed at the establishment of an abnormal filtration through the scar, and the second, the opening up of the normal passages of exit.

Mr. JOHNSON TAYLOR (Norwich) asked whether Dr. Freeland Fergus ever found it necessary to remove the iris, and whether he would do the operation in blind painful glaucomatous eyes which would otherwise have been excised.

Professor E. FUCHS (Vienna) had tried trephining, but farther away from the cornea. He found temporary relief only was obtained. He had also tried cyclodialysis but had given that up also, as it did not permanently cure the cases, and pathological examination showed that when the cyclodialysis was performed, cicatrization completely occluded the spaces between the anterior chamber and perichoroidal space. He thought that nothing known at present could take the place of iridectomy.

Dr. FREELAND FERGUS, in reply, said that his operation was merely a more convenient method of doing Lagrange's operation, and the most important point was to make sure that all sepsis was excluded, and the conjunctiva should be examined bacteriologically before any operation was undertaken. The result of this was that for the last twelve or fifteen years he had operated on over 700 eyes without a single case of sepsis. Normal saline solution was all he ever used to irrigate the conjunctiva. He had done three cases of trephining without cyclodialysis. The operation was much easier than iridectomy, and if it should prove to be equally satisfactory then it should be adopted.

Mr. TREACHER COLLINS opened the discussion on **diseases of the lymphoid tissue of the conjunctiva**. The most serious of these was trachoma, and few observers had the opportunity of watching the cases from start to finish. He, however, was able to do this in the ophthalmic schools of the Metropolitan Asylums Board.

During the past five years 2441 cases were admitted, of which 700 suffered from trachoma. Many were admitted in an exceedingly early stage of the disease, and most were kept until discharged cured. He brought forward several cases to prove how contagious this disease was. In two cases the first symptoms resembled those of acute muco-purulent

ophthalmia. The symptoms, however, did not yield to treatment, but when the congestion had somewhat abated, the typical lymphoid follicles became apparent. Both were cured after about eighteen months of treatment. Another case of a child who deliberately infected her eye, in order to be kept in the house, was cured in a year. Thus the contagiousness of the disease was fully proved, but it was not air-borne, and direct infection must take place.

Mr. COLLINS then alluded to the trachoma bodies discovered by Prowazek and Greeff, independently. They could be seen as minute oval bodies, smaller than the smallest cocci, and were made visible by Giemsa's staining method. The position of these organisms was probably the fibro-adenoid layer, though Prowazek stated that it is in the epithelium, but wherever it was, the changes which it or its toxins excite were most marked in the adenoid layer of the tarsal conjunctiva and retro-tarsal folds, *i. e.*, in those parts where the epithelium was the thinnest.

The trachoma organism appeared to be a non-pyogenic one, but the reaction excited by it was a large new formation of lymphoid tissue, a large increase of plasma cells, and later on a formation of fibroblasts.

Trachoma was essentially a chronic disease though often rendered acute by the mixture of other organisms, but when these were removed the trachoma remained. He considered that the acute ophthalmia which spread through the troops of Sir Ralph Abercromby in 1801 and 1802 was really a mixture of gonorrhœal ophthalmia and trachoma.

The essential element in trachoma was the follicle, and these tended to become confluent, especially in the retro-tarsal fold.

Trachoma follicles might become invaded from the periphery by polynuclear leucocytes, and when an abundant exudation of these highly phagocytic cells was brought about by pyogenic organism or some chemical irritant, they would invade the follicles and cause their absorption, hence the beneficial effect of jequirity or sulphate of copper. The resulting fibrous tissue was probably developed from fibroblasts, and this and the area of hyaline degeneration were often seen in

the later stages of the disease. If the cases were treated early enough but little fibrous tissue would develop.

With regard to pannus, he considered that it resulted partly from the irritation of roughened lids, and partly from a real infection of the cornea. The fact that lymphoid tissue developed in a structure like the cornea that normally had none, was a proof that a trachoma follicle was not a mere hypertrophy of pre-existing lymphoid tissue but a new production for the purpose of defence against the attacking organisms.

As regards treatment he preferred expression and the use of sulphate of copper; the latter set up a mild aseptic purulent inflammation, *i. e.*, an exudation of polynuclear leucocytes which invaded the follicles and brought about their absorption.

Jequiritol was also most useful. X-ray treatment had the great advantage of being painless, but its results were variable, but if an exact and known dose could be applied, it would no doubt tend to produce more uniform results. The results of radium treatment were not very encouraging. If the disease were completely cured, relapses did not take place, though it always took months or years to bring this about. No case was cured which showed any follicular enlargement whatever.

Professor GREEFF (Berlin) said that he looked upon trachoma as a specific infective disease. A vast amount of work had been done to find out the true cause, but all to no effect, until quite recently when the new staining methods of Romanski and Giemsa were devised. He had now found small round bodies, much smaller than any known cocci, and rather like bacteria with rounded extremities. The same year Prowazek had discovered the same bodies independently. He then showed drawings of these trachoma bodies and explained the methods used in order to demonstrate them. As these were so frequently met with in the epithelium, some observers looked upon the disease as a superficial one. With them, however, he did not agree. It was well known the disease penetrated deeply, and quickly recurred if the treatment were left off too soon, and further he had found the bodies in the pressed-out follicles. They were never found in other forms of conjunctivitis and were constantly found in trachoma.

Professor FUCHS (Vienna) said that after the discovery of Professor Greeff and others, he had had many cases examined in his own laboratory. His assistant, Dr. Lindner, stated that the trachoma microbe was present in a large number of both fresh and old cases; they could be seen in the scraped-off epithelium as well as in sections through the conjunctiva, but only in the epithelium. He thought that their presence from a diagnostic point of view was most valuable, especially in cases of mixed infection.

Mr. A. F. MACCALLAN (Egypt) gave his experience of the disease in Egypt. In one of the large Government Schools in which ophthalmic treatment was carried out, the disease was present in 96.43% of the patients.

Mr. CRAIG (Belfast) dealt with the prevalence of trachoma in the Industrial Schools of Ireland, and pointed out the danger to the community through this. He referred to the lack of legislative administration. The progress was far more favorable in healthy individuals under good hygienic surroundings than when the reverse was the case. He deprecated vigorous surgical methods, and was convinced of the superiority of sulphate of copper above other drugs in the treatment of chronic cases.

Dr. JOSEPH NELSON (Belfast) thought that with regard to prevention and treatment more attention than that which was usually given was necessary. He thought that the powers and authorities, both local and imperial, ought to step in and enforce necessary regulations so as to stamp out the disease. He suggested that this Section of the B. M. A. might move a resolution calling attention to the matter.

Dr. W. GORDON BYERS (Montreal) thought the matter should be brought to the attention of the Government. In Canada the Dominion Parliament had, during the last few years, taken steps which had in a marked degree checked the spread of granular conjunctivitis.

Mr. SYDNEY STEPHENSON (London) said that when first he was brought into contact with the Poor Law children much confusion existed between follicular conjunctivitis and trachoma, the former being commonly regarded as an early stage of the latter. In order to settle the question, he had examined the eyes of about 15,000 children in schools of

every class outside the parochial schools, and he found that the conjunctiva was free from follicles in only about 5% of the cases, and this made the above-mentioned theory quite untenable. He agreed that trachoma was not air-borne, and he gave examples from his own experience to prove that it was due to contagion, and on that theory he had succeeded in extirpating it from the Lambeth and Central London schools.

The following resolution was passed:

That the Council of the B. M. A. be asked to draw the attention of the Local Government Boards of the United Kingdom to the prevalence of trachoma amongst the lower classes, to the damage to sight which it frequently entails, to the contagious character of the discharge from the eyes of those affected, and to the importance of preventing any transference of such discharge from one person's eyes to another by washing appliances in the institutions under their control.

MEETING OF FRIDAY, JULY 30, 1909.

Mr. N. BISHOP HARMAN (London) gave a demonstration of the **diaphragm test for binocular vision and its disorders.** The instrument was valuable for the following purposes:

(1) To determine the equality of visual acuity in the two eyes.

(2) To determine the presence or absence of a defect of binocular vision.

(3) To exercise the vision in squinting eyes.

(4) To detect malingerers feigning monocular blindness.

(5) To demonstrate certain physiological phenomena.

In the case of malingerers, the surgeon was able to know by watching the eyes of the patient and seeing if there was co-ordination between the two eyes, whether the patient was using one eye or two.

He had already conducted experiments with the instrument, and had found that by varying the size of the hole in the screen it was possible to estimate numerically the value of the desire for perfect binocular vision, or what was known as the "fusion faculty." The instrument was made by Messrs. George Culver, Ltd. of White Lion Street, London, N., and cost but a few shillings.

Mr. W. B. Inglis Pollock (Glasgow) said he had found the instrument useful after prescribing reading glasses, as it enabled the surgeon to ascertain whether the patient was using both eyes.

Professor Fuchs (Vienna) said he thought the test exceedingly useful and of great value.

Mr. J. H. Tomlinson (London) demonstrated **a scotomograph with binocular fixation.** The instrument could be used for general perimetry, or for accurately mapping out blind or anæsthetic areas. The test object used to prove the sensitiveness of the retina was a second image of the spot used for fixation, and this was obtained from the first image by reflection from a mirror hinged within a cone, the angle of the mirror determining the angular position of the second image on the retina. The instrument could be rotated so as to make the reflected image travel circularly on the retina in the way used in Bjerrum's method. An automatic registration was obtained by a needle carried by the mirror, and extended pneumatically. The second eye looked down another tube at a similar spot, and thus stereoscopic fixation could be obtained.

Mr. Alexander Fleming read a paper on the **serum diagnosis of syphilis.** It differed considerably from the method of Wassermann's modification of Bordet-Gengou. He found in practice that an alcoholic extract of the heart was very suitable for the test, and it was immaterial whether it was obtained from a human being, sheep, rabbit, or guinea-pig. Bauer did away with the immunized rabbit, and made use of the natural hæmolytic power of human serum from sheep's corpuscles. Hecht went further and used the complement as well as the hæmolytic amboceptor which is present in human serum. Fleming's test was a modification of Hecht's method for use with very small quantities of serum. He described his method in detail, which was far less complicated than those previously mentioned. He was able to obtain a positive result in nearly every case, and only a very small proportion of the controls gave other than a negative result. The test was equally applicable to both acquired and congenital syphilis. Of the primary cases, only one failed to give the test, and possibly the chancre he showed was not a

syphilitic one, but the patient could not be traced subsequently. All the secondary cases had given positive results, and practically all the tertiary also. Treatment, when efficiently carried out, modified the reaction, and after a long period the reaction failed. If it were found that the conclusion was warranted, then the value of the reaction would be greatly enhanced, as it would be possible by testing at intervals to lessen the duration of treatment in many cases which failed to give it; while in others, a positive result would indicate that a continuation of treatment was required so as to avoid recurrence, which sometimes took place after even a full course of treatment with mercury.

The discussion on **ophthalmia neonatorum** was introduced by Mr. Sydney Stephenson, who drew attention to the report of the Committee on Ophthalmia Neonatorum issued on May 8th last.

The Committee was a representative one, and was composed of representatives among the gynæcologists, obstetricians, ophthalmologists, bacteriologists, and sanitarians, while the profession at large was represented by the President, the Treasurer, the Chairman of the Council, and the Chairman of Representative Meetings of the B. M. A.

Owing to the far-reaching nature of some of the recommendations, it was decided that it should be referred to the Divisions of the B. M. A. and discussed at this meeting jointly with the Section on Obstetrics, and any recommendations made would be reported to the Ophthalmic Committee.

Dr. TAYLOR (Salford) said that in the report a general principle was involved which might have far-reaching consequences. He thought that the treatment should be left open, as it was liable to such frequent changes, and any one not carrying out the line suggested in the report might be accused of malpractice. If the report passed, he thought that some words should be added which might act as a safeguard to general practitioners who did not follow the treatment suggested.

Mr. NIMMO WALKER (Liverpool) drew attention to the condemnation in the report of the use of Credé's method by midwives, as this method was still being taught to them. He agreed that midwives should not interfere with babies' eyes at all. Although he did not approve the compulsory notifi-

cation of the disease, yet he asked whether the plan was workable, and he pointed out that under the Infectious Diseases Act it applied to medical men only, while notification for midwives could be made compulsory under the order of the Local Health Authority. He emphasized the importance of an ophthalmic department in Eye Hospitals where cases of suspected infection could be watched and treated.

Dr. WENDELL REBER (Philadelphia) paid tribute to the excellent work of Dr. Lucien Howe, who, in the United States, was responsible for most of the legislation concerning the disease. In the United States, the midwife was not allowed to use any prophylaxis other than ordinary cleanliness, and a medical man had to be summoned whenever any inflammatory signs appeared in the eye. Better results could be got if the mother, nurse, and child were in the hospital together. This had for some years been carried out at the Philadelphia General Hospital, and excellent results were obtained.

Dr. J. WHARTON (Manchester) said that a modified form of notification had been in vogue in Manchester for the last three years. This had resulted in a marked reduction in the number of cases of ophthalmia neonatorum. Since then not a single eye had been lost, whereas previously the loss had amounted in some instances to as much as 3%.

Dr. CECIL SHAW (Belfast) suggested the report, as one sharing responsibility for it. He pointed out that it made no attempt to crystallize treatment, but merely made suggestions for a better routine method than Credé's.

Dr. R. A. REEVE (Toronto) suggested that, in order to meet the views of some opponents of the report, the resolution concerning treatment might be somewhat modified.

Mr. N. BISHOP HARMAN ((London) thought that a public feeling should be created on the matter, and then the public bodies might be made to take action. He strongly advocated compulsory notification. His experience in the L. C. C. Blind Schools was very extensive, and his figures indicated that the disease was diminishing.

Dr. H. C. MACTIER suggested that the following words should be inserted: "These are suggestions only, and not definite instructions for treatment."

SYSTEMATIC REPORT ON THE PROGRESS OF OPHTHALMOLOGY IN THE FIRST AND SECOND QUARTERS OF THE YEAR 1908.

By Dr. G. ABELSDORFF, in Berlin; Prof. ST. BERNHEIMER, in Innsbruck; Dr. O. BRECHT, Prof. R. GREEFF, Prof. C. HORSTMANN, and Dr. R. SCHWEIGGER, in Berlin; with the assistance of Prof. A. ALLING New Haven; Prof. E. BERGER, Paris; Prof. CIRINCIONE, Genoa; Dr. DALÉN, Stockholm; Prof. HIRSCHMANN, Charcow; Dr. J. JITTA, Amsterdam; Mr. C. DEVEREUX MARSHALL, London; Dr. H. MEYER, Brandenburg; Dr. P. VON MITTELSTÄDT, Metz; Dr. H. SCHULZ, Berlin; Prof. DA GAMA PINTO, Lisbon; and others.

Translated by Dr. PERCY FRIDENBERG, New York.

Sections XIX.–XXI. Reviewed by Dr. H. MEYER, BRANDENBURG.

XIX.—RETINA AND FUNCTIONAL DISTURBANCES.

393. FEILCHENFELD, H. **Physiological dazzling pain.** *Centralbl. f. Augenh.*, xxxii., p. 97.

394. HESSE, R. **Embolism of central artery.** *Zeitschr. f. Augenh.* xix., p. 440.

395. VAN DUYSE. **Obstruction of central retinal artery; massage; cure.** *Arch. d'opht.*, xxviii., p. 129.

396. PAGENSTECHER, H. **Pigment streaks in the retina.** *Arch. f. Ophth.*, lxviii., No. 1, p. 175.

397. REUTER, H. **Unilateral retinitis pigmentosa.** *Arch. f Augenh.*, lx., p. 59.

398. HEPBURN, M. L. **Visual fields in retinitis pigmentosa.** *R. Lond. Ophth. Hosp. Reps.*, Jan., 1908.

399. v. HIPPEL, E. **Retinal detachment.** *Arch. f. Ophth.*, lxviii., p. 38.

400. DEUTSCHMANN, R. **Treatment of retinal detachment.** *Ophthalmoscope*, August, 1907.

401. SACHS, M. **Operation for retinal detachment.** *Wiener klin. Wochenschr.*, 1908, No. 43.

402. STRAUB, M. **Prognosis in retinal hemorrhage due to arteriosclerosis.** *Klin. Monatsbl. f. Augenheilkunde*, xlvi., No. 1, p. 517.

403. NOLL, H. **Case of hole in the macula.** *Arch. f. Augenheilkunde*, lx., p. 254.

404. KNAPE, V. **Very rare ophthalmoscopic picture.** *Arch. f. Augenheilkunde*, lx., No. 49.

405. SHIBA, S. **Experimental study of albuminuric retinitis.** *Klin. Monatsbl. f. Augenheilkunde*, xlvi., No. 8, p. 387.

406. DE LAPERSONNE, F. **Choroidal atrophy in old chorioretinitis.** *Soc. d'opht. de Paris*, March 10, 1908.

407. LUKENS, C. **Glioma retinæ. Binocular case cured.** *Trans. Amer. Acad. Ophth. and Oto-Lar.*, 1908.

408. COATS, GEORGE. **Forms of retinal disease with massive exudation.** *Royal London Ophthalmic Hospital Reports*, xvii., part iii., 1908.

409. HANCOCK, ILBERT. **Certain points about the fields and fundus changes in obstruction of the central artery of the retina.** *Royal London Ophthalmic Hospital Reports*, xvii., part iii., 1908.

410. NETTLESHIP, E. **On retinitis pigmentosa and allied diseases.** *Royal London Ophthalmic Hospital Reports*, xvii., parts i., ii., and iii., 1908.

411. LODATO, G. **Phosphaturia in ocular disease.**

412. CUPERUS, N. **Rare case of retinal embolism.** *Ned. Tydsschr. v Geneesk.*, 1908, No. 1, p. 10.

413. KALT. **Traumatic paracentral ring scotoma.** *Soc. d'opht de Paris*, March 10, 1908.

414. VERDERAME, P. **Histology of solitary tubercle of optic disk.** *Klin. Monatsbl. f. Augenheilkunde*, xlvi., No. 1, p. 401.

415. V. D. BORG, J. **Papillitis in disease of the anterior segment.** *Ned. Tydsschr. v. Geneesk.*, 1908, No. 1, p. 9.

416. HOFFMANN, H. **Clinical study of hemianopsia.** *Inaug. Diss.*, Tuebingen, 1908.

417. REDLICH, E., and BONVICINI, G. **Unconsciousness of blindness in cerebral disease.** *Leipzig. Deuticke*, 1908.

418. SEMPLE, N. M. **The pathology of the retina in Bright's disease.** *Amer. Jour. of Ophth.*, March, 1908.

419. WILLIAMS, CARL. **A case of quinine amaurosis.** *Annals of Ophth.*, January, 1908.

420. WOOD, C. A. **Probable tumor of the pituitary body without giantism, but exhibiting a bi-nasal hemiopia.** *Ophth. Record*, March, 1908.

421. POSEY, WM. C. **Report of a case of right hemianopsia in the macular regions.** *Ophth. Record*, May, 1908.

422. PARSONS, J. H. **Night-blindness.** *Lancet*, February 22, 1908.

423. FISHER, J. H. **A case of chiasma lesion which improved under the administration of thyroid extract.** *Ophthalmic Review*, April, 1908.

424. PARKINSON, J. P. and HOSFORD, J. S. **Cerebellar tumor with proptosis.** *Ophthalmic Review*, May, 1908.

425. DE SCHWEINITZ, G. E. **The eye and the kidney.** *Penn. Med. Jour.*, November, 1907.

426. DE SCHWEINITZ, G. E., and FIPE, C. A. **Auto-intoxication with general and laboratory examinations.** *Jour. A. M. A.*, June 20, 1908.

427. TYSON, H. H., and CLARK, L. P. **The eye syndrome of dementia præcox.** *Jour. A. M. A.*, May 2, 1908.

HESSE (394, **Embolism of central artery**) reports a case with slight general retinal changes, in which a visible embolus could be followed in its migration under the influence of digital massage. After cessation of pressure, the embolus was swept to the nearest branch, where it became comminuted and was carried into the smaller vessels in a finely divided state leading to clouding of the corresponding retinal area.

VAN DUYSE (395, **Obstruction of central retinal artery; massage; cure**) noted, in a woman of seventy-two, sudden blindness of the left eye, with the ophthalmoscopic picture of embolism. Pressure massage was instituted within an hour. Two days later, fingers were counted, and on the third day vision was normal with correction. It is very questionable whether there was an actual embolus in this case and that it was broken up by massage, or whether the case was one of temporary blindness from spasm of the retinal artery (intermittent retinal claudication.—P. H. F.).

PAGENSTECHER (396, **Pigment streaks in the retina**) mentions a case of Oeller's, which was very similar to his own, of angioid streaks, but he does not share Oeller's view of the origin of these streaks from diapedesis of blood and hematogenous pigmentation from already existing and very minute vessels.

REUTER (397, **Unilateral retinitis pigmentosa**) reports a case which seems to support the dictum of Hutchinson and Leber, that unilaterality in this disease always suggests syphilis. In this case, retinitis pigmentosa developed six years after the initial sclerosis. Eight similar cases are collated from literature, of which at least four were suspected of syphilis. Bilateral retinitis, aside from the factor of consanguinity, often depends on syphilis, which is often difficult to establish.

HEPBURN (398, **Visual fields in retinitis pigmentosa**) confirms the well-known finding of positive or negative annular

scotoma, giving details of six cases. Nerve disease, as a causal factor, may be excluded, and the hypothesis of occlusion of certain vessels supplying the affected area (Gonin and Nettleship) is probably correct, as islands of sight are often preserved in the affected area for some time before a complete ring scotoma has been formed. There is a tendency to compensatory circulation in other parts of the retina after the loss of certain ciliary vessels.

V. HIPPEL (399, **Retinal detachment**) quotes the view of Leber and Nordenson who consider as fibrillary thickening of the vitreous a condensation of the entire mass which is not a result of fibrillary degeneration. This shrinkage is not an artefact due to fixing fluids. The histologic examination of two cases is given at length. In one, the vitreous was compressed by an exudation. Glassy hyaloid structures, staining red with van Gieson, were noted on the inner surface of the retina, which probably serve to mediate the traction, according to the hypothesis of Leber and Nordenson, of the vitreous on the retina.

DEUTSCHMANN (400, **Treatment of retinal detachment**) discusses the various therapeutic procedures. Passive treatment is useless, and only two operative procedures, incision of the exudation and of the retina, are of any value. In desperate cases, injection of sterilized calves' vitreous in increasing concentration, by means of a special knife syringe, is advised. Three cases were cured by this means, 26 more or less improved, and 38 unimproved. Good results were obtained by operation in about 25% of the cases.

SACHS (401, **Operation for retinal detachment**) recommends as new, the routine puncture of the detachment at or behind the equator. The retina becomes re-attached permanently, as far as can be seen.

STRAUB (402, **Prognosis in retinal hemorrhage due to arteriosclerosis**) saw 15 cases within a comparatively short time and gives statistical details. The prognosis *quoad vitam* is bad only in individuals in middle age, while very old and younger patients are more favorably situated. Two cases are reported in which the hemorrhages retrogressed in the course of anti-glaucomatous treatment.

Noll (403, **Case of hole in the macula**) analyzes the cases on record to show that the fundus picture may be explained by traumatism and by disease processes as well. He reports three cases from the Wuerzburg clinic. In one, general arteriosclerosis was the only etiological factor ascertainable; the second was complicated with retinitis pigmentosa, a rare condition; and in the third, of traumatic origin, the development of the hole at the macula and subsequent pigment deposit could be followed with the ophthalmoscope.

Knape (404, **Very rare ophthalmoscopic picture**) describes a glioma of the retina which was covered with a sort of cirsoid aneurism, suggesting the rare case reported by Hippel and one or two others, in which angioma or other vascular anomalies were noted and gave the basis for an attempt at uniform classification. Knape thinks the vascular anomalies and pathological changes may be due to a variety of causes.

Shiba (405, **Experimental study of albuminuric retinitis**) took up the question of degeneration of nervous elements on a vascular basis as the cause of albuminuric retinitis. Injection of tincture of iodin into the parenchyma of the kidney of rabbits was followed, in 6 out of 9 cases, by œdema of the inner layers of the retina. No changes were discovered in the vessel walls. The change in the constitution of the blood is the first and direct cause of insufficiency and later of anatomical changes in the walls of the retinal vessels.

de Lapersonne (406, **Choroidal atrophy in old chorioretinitis**) presented a girl of twenty with post-neuritic atrophy of the right eye, with white and yellowish-white strands running from the disk and macula into the vitreous and branching with plaque formation. This condition the author attributes to an old chorioretinitis.

Lukens (407, **Glioma retinæ. Binocular case cured**) publishes, under a misleading sub-title, the report of a case in which an eye was enucleated for glioma, and glioma developed in the fellow eye two years later, requiring its immediate enucleation. Two years later there was, as yet, no recurrence.

Coats (408, **Forms of retinal disease with massive exudation**) contributes another of his valuable pathological monographs.

These somewhat rare cases show a massive white billowy exudate under the retinal vessels, which often projects far into the vitreous. The patients are generally perfectly healthy there is no known cause for the condition. The author gives a minute histological account of six eyes affected with the disease which he has been able to examine microscopically. In all of them there is a common factor, the presence of a massive exudate in the fundus. Coats divides the cases into three groups. Those with and without gross vascular disease, a peculiar group characterized by the presence of large arterio-venous communications. The pathological history is as follows. There is first of all hemorrhage from the outer reticular layer of the retina. It collects between the nuclear layers. Detachment may occur. The blood breaks down, forming debris, fibrin, and cholesterin. A slow formation of granulation tissue takes place. Cicatricial contraction sets in, the retina crumples up and detaches further. Then there may be complete detachment, with cataract and iritis. There is often secondary glaucoma from occlusion of the iridic angle. The microphotographs which illustrate the paper are extremely beautiful. T. Harrison Butler.

Hancock (409, **Certain points about the fields and fundus changes in obstruction of the central artery of the retina**) has collected the statistics of cases of obstruction of the arteria centralis retinæ. He finds that in a large proportion of them the patient is not absolutely blind. There is often a patch of functional retina at the extreme periphery, and in most cases it is situated on the nasal side. He is inclined to think that some parts of the peripheral retina are nourished by the chorio-capillaris. This is certainly the case in some of the lower animals. The second part of the paper discusses the nature of the retinal opacity observed after obstruction of the central artery of the retina. It is generally regarded as an œdema, but there is no evidence for this view. Hancock inclines to the opinion that the appearance is due to a congelative necrosis of the superficial retinal layers.

T. Harrison Butler.

Nettleship (410, **On retinitis pigmentosa and allied diseases**) This paper, which extends through the whole of the seventeenth volume of the Reports, leaves little more to be said

about retinitis pigmentosa from the standpoint of heredity. Nettleship has collected over 190 cases of the disease, and whenever possible he appends an extensive family tree. The subject is grouped under the following chief heads: Continuous heredity. Discontinuous heredity. Heredity with consanguinity. Consanguinity. Sex and age of parents. Relation to birth order. Associated defects. Variations. Seat of earliest changes. Earliest age of visible pigmentation. Distribution of pigment. Age of blindness. Senile cases. Hemeralopia, Nyktalopia. Scotoma. Ophthalmoscopic variations. Sine pigmento. R. punctata albescens. Congenital absence of choroid, etc. The paper is mainly statistical; it is very long and does not lend itself to analysis. It is a monument of industry, and will always be useful as a source of reference. T. HARRISON BUTLER.

LODATO (411, **Phosphaturia in ocular disease**) found this urinary anomaly in optic-nerve affections and ophthalmoplegia due to disturbances of metabolism, from catching cold.

CUPERUS (412, **Rare case of retinal embolism**) treated a patient, aged thirty-nine, with diminished vision in the left eye, of eight days' standing. Ophthalmoscopic examination showed an occlusion of the lower main branch with a corresponding peripheral scotoma. Slight circumcorneal injection with chemosis, and retinal conditions like those in complete embolism. The conditions seem to indicate a connection between the blood supply of the retina and that of the choroid in this case.

KALT (413, **Traumatic paracentral ring scotoma**) reports a case of this sort with pallor of the temporal half of the disk and a gray-white strand running from the upper margin of the disk into the retina.

HOFFMANN (416, **Clinical study of hemianopsia**) reports 44 cases, of which 17 were bi-temporal, 12 homonymous right, and 15 homonymous left. Choked disk was not seen in the bi-temporal form. In acromegaly, exophthalmus was noted in two cases, and diabetes insipidus in one. Hemianopsia during delivery may be due to hemorrhage or embolism in the visual paths, or to loss of blood.

REDLICH and BONVICINI (417, **Unconsciousness of blindness in cerebral disease**) note this condition in cerebral hemian-

opsia with amaurosis due to disease of the occipital lobes and in general brain disease. It may be an intermittent symptom due to general psychic deterioration, or to hallucinations, or complete destruction of all visual processes, and is a part of the general and marked disturbance of cerebral function. In marked concentric contraction of the field the patients may not be conscious of the preserved part of the field.

SEMPLE (418, **The pathology of the retina in Bright's disease**) studied microscopically three specimens which were taken immediately after death from patients who had been observed during the progress of nephritis. His findings differ somewhat from generally accepted views. The pathologic changes were essentially the same in the three cases, although varying in stage of development. He found the outer reticular layer chiefly affected, with less marked changes in the inner nuclear, ganglion-cell, and nerve-fibre layers. Those in the outer reticular layer were the cyst-like spaces which are well known and the more or less extensive deposits of irregular masses, variously described as colloid, coagulation necrosis, or fat cells. Semple, however, after extensive studies regards them as identical with the substance first described by v. Recklinghausen as hyalin, which is formed in extravasations derived from the colorless elements of the blood and wandering cells, and not, as has been thought, from degeneration of tissue cells. This is proven by the fact that the masses lie between the thickened supporting fibres of the retina, and the cells of the adjacent granular layer show no pathologic changes. Another condition, which has been described as varicosities of the axis-cylinders in the nerve-fibre layer, is believed by him to be masses of degenerated ganglion cells, which have been forced from their normal situation in the ganglion layer into the nerve-fibre layer often as far as the internal limiting membrane. These masses show essentially the same reaction as those in the outer reticular layer, *i. e.*, the cells have degenerated into hyalin. He found absolutely no evidence of fat or fatty degeneration in his specimens, but does not deny such findings in older cases, all of his having been from patients in whom the retinitis had existed probably not more than four weeks. ALLING.

WILLIAMS'S (419, **A case of quinine amaurosis**) patient was a woman, twenty-two, who had taken 80 grains of quinine sulphate at one time. There was at first complete blindness, but vision gradually returned. Five years after the poisoning, the vision under good illumination was practically normal, but in diminished light disproportionately poor. The fields for color and form were uniformly contracted, and the fundus showed a pale nerve, narrow vessels, and a perivascularitis along the large arteries. ALLING.

There was no previous history in the case reported by WOOD (420, **Probable tumor of the pituitary body without giantism, but exhibiting a bi-nasal hemiopia**), but the X-ray showed evident enlargement of the sella turcica, with a faint shadow in the same neighborhood, which probably represented an enlarged hypophysis. The author is unable to diagnose the character of the tumor, nor is he able to explain the apparent improvement which took place in the central vision and nasal fields under the use of large doses of iodides. ALLING.

POSEY (421, **Report of a case of right hemianopsia in the macular regions**) describes a peculiar field of vision showing in each eye downwards and to the right a sector defect extending ten degrees from the macula. The trouble came on suddenly, probably as an apoplexy. There were no other defects in the eye and the direct vision was normal. Difficulty in reading was experienced on account of the field defect, this being the more aggravated from the fact that the fault was toward the right. A few similar cases have been reported and Wilbrand believed the lesion to be in the calcarine artery, which largely supplies the visual area and is a terminal circulation, *i. e.*, without anastomoses. Such a cause in a case like this would refute Monakow's view to the effect that the macula is represented in all parts of the cortical visual centres. ALLING.

PARSONS, J. H. (422, **Night-blindness**) notes that hemeralopia is usually associated with retinitis pigmentosa, but it is also a common condition in India and similar countries quite apart from this well-known disease. In retinitis pigmentosa central vision is preserved till a late stage, when it becomes obscured, not by a retinal change, but by a posterior cortical

opacity in the lens. The scotoma is seldom a complete one; it is often a ring scotoma containing visual islets. The field of vision has been carefully investigated by Hepburn (his paper is abstracted in this Journal). These visual islets are probably closely related to the distribution of the vessels. The chorio-capillaris is first attacked, the retinal degeneration being secondary. The outer layers of the retina are nourished by the chorio-capillaris, and in retinitis pigmentosa the inner layers of the retina show little change. In birds which seek their prey by night, such as owls, the retina contains only rods; there are no cones. The visual purple is associated with the rods only, so that in animals possessing a fovea, where the rods are absent, the visual purple is also wanting. In man there is much more diminution with low illumination of central than of peripheral vision, so we may conclude that in dim light vision is chiefly carried on by the rods. Form sense, dependent upon the cones, quickly diminishes from the fixation point to periphery, but at night appreciation of light and shade is more important than accurate delineation of objects. These considerations may explain the hemeralopia in retinitis pigmentosa, as well as the nature of the scotoma.

There is a hereditary form of night-blindness. In one family investigated by Cunier and Nettleship there have been 135 subjects of the disease among 2121 individuals. The first member, a night-blind male, was born in 1637.

Night-blindness is also associated with syphilitic pigmentary retinitis.

There are acute forms of hemeralopia, which have one common feature—malnutrition. It is frequent in badly nourished children, many of whom have xerosis of the cornea; but there are many cases of xerosis without hemeralopia, and *vice versa*. The cornea may ulcerate or there may be keratomalacia. This disease is common among the peasants of Russia, especially during the Lenten fast. Most of these patients suffer from photophobia. The cause is probably peripheral, for Mr. Nettleship has stated that if a night-blind sailor cover one eye during the day, this eye will see well enough at night for the man to go on watch.

Another group of cases is associated with jaundice; in some, pigmentary changes of slight degree have been found

in the retina, and the condition has been called ophthalmia hepatica. It is worthy of note that bile salts are a solvent for the visual purple.

Night-blindness is common among the badly nourished nations of India, especially during famine. (It is also equally common in Palestine, where the natives are chronically under-fed.—T. H. B.) It is said that the symptom can be cured by a liver diet. This mode of treatment is of extreme antiquity, being advocated in the Ebers papyrus (B. C. 1000).

T. HARRISON BUTLER.

FISHER (423, **A case of chiasma lesion which improved under the administration of thyroid extract**), after summarizing the facts of a similar case recorded by Richardson Cross in *Brain*, vol. xxv., part 2, p. 341, describes his own case. The patient, aged twenty-six, a male, was laid up by "influenza," during which he had severe headache but no vomiting or vertigo. Eighteen months before he was seen by Fisher he began to observe that when he closed his right eye he was unable to see objects on his left. The sight of the left eye was rapidly lost. When first seen he showed VR=$\frac{6}{24}$ partly with hemianopia. VL=no light perception. Both disks pale and atrophic; no evidence of any antecedent papillitis. Left pupil inactive to light, but acted consensually with the right pupil. The right gave the hemianopic reflex. No sign of acromegaly. Thyroid not felt or seen; no myxœdema. Fisher put his patient upon 5 grains of thyroid extract twice a day, and continued it for two years. The hemianopic field gradually recovered, vision improved up to $\frac{6}{9}$, and patient works as a laborer, wheeling barrows along a plank with ease. No nasal trouble was present. Mr. Fisher has just informed me personally that the patient is still improving (Dec., 1908).

T. HARRISON BUTLER.

PARKINSON and HOSFORD (424, **Cerebellar tumor with proptosis**). The patient, aged fourteen years, developed pains in the back of the neck, then had two fits, after which sight began to fail and diplopia came on. Vertigo was next noticed and proptosis followed. When seen she had great exophthalmos but no œdema or chemosis. Well-marked paresis of Rt. external rectus. Horizontal nystagmus. Intense optic

neuritis and hemorrhages. V = finger counting. In right macula a stellate whitish mass of exudate. No knee-jerks; Kernig's sign absent. At the post-mortem a fibro-psammoma was found attached to the pia on the under surface of the right lobe of the cerebellum. It pressed upon the restiform body and medulla on the right side.

T. HARRISON BUTLER.

DE SCHWEINITZ (425, **The eye and the kidney**) treats this subject under the following heads: 1. Complete blindness without ophthalmoscopic lesions; uræmic amaurosis; due to action of toxins on ganglion cells of retina, but supposed by some to be cortical. 2. Various types of retinitis and neuro-retinitis. 3. Alterations in the retinal vessels due to sclerotic changes in the walls. 4. Alterations in the uveal tract. 5. Cataract. 6. Paresis and paralysis of ocular muscles.

ALLING.

The cases studied by DE SCHWEINITZ and FIFE (426, **Auto-intoxication with general and laboratory examinations**) were relapsing sclero-keratitis, disseminate exudative choroiditis, relapsing uveitis, and central exudative choroiditis. Many painstaking examinations were carried on, including laboratory analyses. They conclude that there is no disease which is known to be uniformly due to auto-intoxication and no definite toxin has been isolated to account for such diseases as those above mentioned. Yet it seems worth while to know what can be gleaned from examination of the body secretions as an aid to proper treatment, dietetic as well as medicinal.

ALLING.

Previous to the work of TYSON and CLARK (427, **The eye syndrome of dementia præcox**) little had been done in the way of systematic study of this subject. They examined 115 cases and conclude, that certain eye symptoms are so constant as to be of material aid in differential diagnosis from the manic-depressive group, neurasthenia, hysteria, and various forms of imbecility. Such symptoms affecting the optic nerve are, in the order of their occurrence: (1) congestion of the disks, with dilated veins and contracted arteries; (2) congestion of the nasal and pallor of the temporal side of the disk; and (3) pallor of the entire disk. There was further concentric contraction of the color fields. The sensory

pupillary reflex was slightly positive in 6 cases but negative in 79. Corneal sensibility was diminished in 69 and present in 17. The syndrome is a distinct contribution to the theory of auto-intoxication as the cause of dementia præcox.

ALLING.

XX.—OPTIC NERVE.

428. BARTELS. **Primitive fibrils in the axis-cylinders of the optic nerve.** *Arch. f. Augenheilkunde*, lix., p. 160.

429. VAN DEN BERG. **Papillitis after disease of anterior segment of the eye.** *Klin. Monatsbl. f. Augenheilkunde*, xlvi., No. 1, p. 359.

430. ELSCHNIG, A. **Topography of nerve head in simple atrophy.** *Arch. f. Ophth.*, lxviii., No. 1, p. 126.

431. ROLLET. **Hematoma of optic-nerve sheath. Four cases.** *Rev. gén. d'opht.*, xxvii., p. 49.

432. VERDERAME, PH. **Solitary tuberculosis of the optic papilla.** *Klin. Monatsbl.*, xlvi., No. 1, p. 401.

433. COATS, G. **Pathology of coloboma at the nerve entrance.** *Royal London Ophthalmic Hospital Reports*, January, 1908.

434. COATS, G. **Congenital pigmentation of papilla.** *Ibid.*

435. HANCOCK, W. J. **Hereditary optic atrophy (Leber's disease).** *Ibid.*

BARTELS (428, **Primitive fibrils in the axis-cylinders of the optic nerve**) notes that only those varicosities are pathological which exceed the thickness of the normal axis-cylinder. Narrower fibrils are caused by irregular shrinkage in fixation, and "varicosities" thus caused are artefacts.

VAN DEN BERG (429, **Papillitis after disease of anterior segment of the eye**) discusses 9 cases of this sort, both of traumatic and of inflammatory origin, which consists in a serous swelling of disk and adjoining retina. This change invariably follows the experimental production of intraocular tuberculosis, where it is not an expression of infection but of chemotactic action, similar to collateral œdema in the vicinity of other inflammatory processes. While similar to choked disk there is no protrusion of the lamina cribrosa.

ELSCHNIG (430, **Topography of nerve head in simple atrophy**) reports 6 cases, 10 eyes, in which histological examination was made. Simple nerve degeneration can not produce the picture of atrophic excavation, as the connective tissue and supporting fibres of the lamina do not share this atrophic process. Nerves without a pre-existing physiological excava-

tion are never changed so that the lamina becomes visible. Any excavation in a case of simple atrophy is the original physiological excavation. Marginal excavation is produced by glaucomatous atrophy only. Filling up of a physiological excavation is the rule in post-neuritic atrophy. A new-formed mass of connective tissue, reaching from the choroid to the central connective-tissue band and resembling a second scleral ring, is often found.

ROLLET (431, **Hematoma of optic-nerve sheath**) reviews three cases. In one, there was fracture of the skull by contrecoup. No ophthalmoscopic examination. Autopsy showed hemorrhage into the sheath of the nerve. In the second case there was a fracture of the base with no fundus changes but unilateral amaurosis. In the third case, confirmed by autopsy, after fracture of the base, there was the characteristic fundus picture of a black ring about the disk, which could easily be distinguished from the choroidal ring with hyperæmia of the disk and markedly contracted, thread-like arteries.

VERDERAME (432, **Solitary tuberculosis of the optic papilla**) found tubercle bacilli in the granulation tissue in a case with probably tuberculous pleurisy but no other history of tubercular heritage. Primary tuberculosis of the eye is exceedingly rare.

COATS, G. (433, **Pathology of coloboma at the nerve entrance**) has collected together in this paper all that is known about the subject.

The condition is seen ophthalmoscopically as a deep pit, often several times the diameter of the normal disk. The vessels emerge from its depths with a variable arrangement, and bend sharply over the overhanging edge.

After passing the literature in review, Coats describes the anatomy of three cases he examined pathologically; he then analyzes the whole subject.

It is impossible to make a short abstract of the paper, which is a most valuable contribution to our knowledge of the subject.

Three instructive microphotographs are appended.

T. HARRISON BUTLER.

COATS, G. (434, **Congenital pigmentation of papilla**). This

paper, which is illustrated by a beautiful colored plate, describes a very unusual example of pigmentation of the optic disk. In it the whole question of pigmentation of the papilla is very thoroughly discussed.

The patient, aged sixty-nine, had in one eye a large pigmented patch on the lower and somewhat nasal aspect of the disk. It occupied a fourth to a fifth of its area. It is not confined to the disk, but one third of it is outside its limits. From its superior border an elongated tongue of pigmented tissue stretches upwards immediately within the nasal margin of the disk, terminating a little above its mid point. The nasal edge of the tongue is whitish and glittering, the temporal deeply pigmented. The pigmented area is distinctly swollen, probably rising about 2 D. A large artery takes a considerable bend over it. The color of the swelling is pure black. There is no shade of green or brown in it. The retina appears to be present over the mass as a faint shimmering veil. Close to the disk in an upward nasal direction there is a delicate, translucent connective-tissue film, which covers without concealing the vessels.

The patient was seen 14 months later when the conditions were exactly the same.

The corrected vision was $\frac{6}{6}$ and J. 1.

The differential diagnosis lay between (1) sarcoma; (2) pathological pigmentation; (3) congenital pigmentation.

The first was ruled out on account of the presence of the connective-tissue veil, and because there was no change in fourteen months.

In cases of pathological pigmentation the appearances are not the same. There is always reason to suspect hemorrhage into the nerve or its sheaths, and in consequence there is usually optic atrophy and the vision is very bad.

Coats decided that the case under consideration was one of congenital pigmentation, a conclusion which was strongly supported by the presence of the web of connective tissue.

T. Harrison Butler.

Hancock, W. I. [435, **Hereditary optic atrophy (Leber's disease)**] gives an account of a sufferer from Leber's disease and of the pathological history of his family.

The patient, J. M., age twenty-six, first noticed mistiness

on fixation, which increased rapidly. On examination, RV = fingers counted eccentrically, not improved; LV = the same.

L. pupil slightly larger than R.; both react sluggishly to light, briskly to convergence. Slight meiosis badly maintained; after some oscillations the pupils came to rest semi-dilated. Both disks showed marked pallor, especially in the temporal halves. The outlines were ill defined, but no hemorrhages or exudate. Physiological cups filled in. The fields show a central scotoma within the 10°-circle. Patient smokes 5 to 10 cigarettes a day. No history of syphilis. Subject to epilepsy. Patient advised to take a long sea voyage and give up tobacco.

In a year the condition was so much improved that V R and L = $\frac{6}{6}$; J. 1. Both eyes together $\frac{6}{6}$ partly. The light sense was very defective; V = $\frac{3}{60}$ with Bjerrum's types.

After 8 months the scotoma was found to be a ring-scotoma. Members of the family for five generations had been attacked by failure of sight.

The original ancestor 100 years ago had bad sight in the third decade of life which improved in later life. He married and had three sons and three daughters all healthy. Only two daughters married; one had eight children and all the boys, three in number, were affected. The other daughter had one son, of two, affected. Seven other male sufferers were traced in the families from the first daughter. Details are given on many of the cases. Hancock himself has seen three of them.

Of the 12 examples of the disease, 6 have recovered and another is improving. This is a most unusual proportion of recoveries.

All but one acquired the disease in the third decade of life. Leber's figures are in agreement with this. The age of twenty is the commonest for the disease to appear in. Usually males only are attacked, but when females suffer the malady appears at the climacteric. The disease is transmitted through the female line. There are several cases recorded in which a central scotoma is associated with a large defect in the field of vision, and this defect tends to reappear in subsequent cases in the same family. T. HARRISON BUTLER.

XXI.—INJURIES, FOREIGN BODIES, PARASITES.

436 VOGT, A. **Multiple isolated tears of Descemet's membrane during birth.** *Klin. Monatsbl. f. Augenheilkunde*, xlvi., No. 1, p. 134.

437. BIELSKY. **Removal of chips of steel from vitreous with Volkmann's magnet; two cases.** *West. Ophthalm.*, No. 3, 1908.

438. SHUMWAY, E. A. **Double perforation of the eyeball by metallic foreign bodies.** *Annals of Ophth.*, October, 1907.

439. KUEMMELL, R. **Some notable foreign-body injuries of the eye.** *Zeitschr. f. Augenheilkunde*, xix., p. 36.

440. WARNECKE. **Double perforation of globe with a knife. Implantation of a lash and epithelium in the scar of the posterior wall of globe.** *Centralbl. f. Augenheilkunde*, xxii., p. 161.

441. GOULDEN, C. **Fate of eyes submitted to magnet operation.** *Royal London Ophthalmic Hospital Reports*, January, 1908.

442. HENSELL, E. **Case of gunshot wound of eye.** *Inaug. Diss.*, Giessen, 1908.

443. WEINSTEIN, A. **Gunshot wound of eye.** *Klin. Monatsbl. f. Augenheilkunde*, xlvi., No. 1, p. 531.

444. AMBERG, H. **Cases of foreign bodies removed with inner-pole magnet.** *Zeitschr. f. Augenheilkunde*, xviii., H. 6.

445. LOPEZ, F. **Case of subretinal cysticercus.** *Ann. of Ophthal.*, October, 1907.

446. HAPPE, H. **Papillitis after slight penetrating wounds of anterior segment of the eye.** *Klin. Monatsbl. f. Augenheilkunde*, xlvi., No. 1, p. 383.

VOGT (436, **Multiple isolated tears of Descemet's membrane during birth**) made a histological study of the eye of a newborn child in which this accident had been produced by pressure of obstetric forceps. The inner membrane of the cornea is under greater stress in compression, as is the inner table of the skull than the outer. There is an analogy with a greenstick fracture over the convexity of the bend. Descemet's membrane seems to offer very little resistance to tension.

BIELSKY (437, **Removal of chips of steel from vitreous with Volkmann's magnet; two cases**) finds this large form very suitable. The pole, which can be lengthened to 11*cm*, is short enough to obviate any interference with a view of the field.

SHUMWAY (438, **Double perforation of the eyeball by metallic foreign bodies**) reports a typical case in which the eye remained quiet for two weeks after the injury. Then an acute irido-cyclitis developed with rapid and progressive

course, with infection backward along the nerve to the meninges. After enucleation of the globe the foreign body was found, as indicated by the X-ray, in the depth of the orbit.

KUEMMELL (439, **Some notable foreign-body injuries of the eye**) reports a case of migration of a foreign body from the anterior chamber where it had been at rest for years. In another case, a small shot pellet had penetrated the root of the iris, and, without injuring the lens, glanced from the equator and came to rest on the ciliary body. A year and a half later it was found at the bottom of the anterior chamber.

WARNECKE (440, **Double perforation of globe with a knife. Implantation of a lash and epithelium in the scar of the posterior wall of globe**) reports a case of injury with a pocket knife. The eye had to be enucleated later, and microscopical examination showed that a lash with the bulb and germinative epithelium of the sheath had been carried into the eye and had become surrounded by granulation tissue in the choroid of the posterior portion of the globe.

GOULDEN (441, **Fate of eyes submitted to magnet operation**) gives the final results in 118 eyes in which the foreign body was brought into the anterior chamber by means of the giant magnet and either then removed with the hand magnet through a corneal incision or localized by the X-ray and then removed by the hand magnet introduced through a scleral incision. Foreign bodies in the vitreous were removed with better results than those which stuck fast in the lens. Where the sclera had been penetrated or had to be incised for removal the results were bad.

HENSELL (442, **Case of gunshot wound of eye**) reports 5 cases of perforation by shot, and one of contusion. The prognosis and diagnostic features of these injuries are considered at length.

WEINSTEIN (443, **Gunshot wound of eye**) reports a case of attempted suicide with severing of the optic nerve. Hirschberg's statistics show 30% of blindness of the right eye after shot through the temple with a revolver. Loss of both eyes is unusual. In this case the bullet went through the outer wall of the right orbit, below the lamina cribrosa of the ethmoid, penetrating the inner wall of the left orbit and remaining

imbedded in the outer wall. Both nerve heads were torn off, leaving dark holes in place of the disks.

AMBERG (444, **Cases of foreign bodies removed with inner-pole magnet**) reports 16 more cases in which Mellinger's inner-pole magnet was used, making 31 in all. The depth of penetration into globe seems about proportional to the weight of the foreign body.

LOPEZ (445, **Case of subretinal cysticercus**) extracted a cysticercus which was located near the nerve head, after tenotomy of the superior rectus and opening of Tenon's capsule followed by incision of sclera and choroid. The media remained clear, but a large atrophic choroidal patch and optic atrophy reduced vision to counting fingers.

HAPPE (446, **Papillitis after slight penetrating wounds of anterior segment of the eye**) reports two cases, which are interesting as showing that a slight perforation at the limbus may cause a typical inflammation of the disk, which persists or even advances after the original irritation of the anterior segment has subsided. The noxious agent is probably a weak toxin, perhaps a cytotoxin, which acts through the medium of a fleeting infection of the vitreous or else by way of the suprachoroidal space.

Section XXII. Reviewed by Prof. HUMMELSHEIM, BONN.

XXII.—OCULAR AFFECTIONS IN SYSTEMIC DISEASES.

447 OVIO, G. **Dilatation coefficient.** XIX. Cong. Ital. Ophthalmologists, No. 2, 1907.

448. NAGEL, W. **Size of pupil and light sensitiveness.** Berlin Ophthalmological Society, December 19, 1907.

449. VERAGUTH, O. **Pupillomotor field of the retina.** *Neurol. Centralbl.*, 1908, p. 402.

450. LEDERER, R. **Localization of pupillary centre.** *Prager med. Wochenschr.*, xxxiii., p. 355.

451. ALBRAND, W. **Oculistic significance of degenerative stigmata.** *Arch. f. Psych. u. Nervenkr.*, xxxiv., p. 121.

452. LAQUEUR, L. **Pupil reaction in disease.** *Arch. f. Augenheilkunde*, lix., p. 527.

453. LANGMEAD, F. **Pupillary signs in chorea.** *Lancet*, January 18, 1908.

454. REDLICH, E. **Peculiar pupillary phenomenon: hysterical pupillary paralysis.** *Deutsche med. Wochenschr.*, 1908, p. 313.

455. ABELSDORFF, G. **Unilateral reflex pupillary rigidity in oculomotor paralysis.** *Med. Klinik*, 1908, p. 289.

456. LEVINSOHN, G. **Meiosis in reflex pupillary rigidity.** *Berlin. klin. Wochensch.*, 1908, p. 745.

457. NEUSSEL, L. **Pupil in alcoholism.** *Inaug. Diss.*, Munich, 1908.

458. KOENIG, H. **Ocular symptoms of multiple sclerosis.** *Inaug. Diss.*, Leipzig, 1908.

459. DAVIDS, H. **Ocular conditions in paralytics.** *Monatsschr. f. Psych. u. Nervenk.*, xxiii., Supplement, p. 1.

OVIO (447, **Dilatation coefficient**) finds the rate and degree of dilatation on reduction of illumination inversely proportional to light intensity. With regular diminution the dilatation at first takes place slowly, and then with successively increasing rapidity.

NAGEL (448, **Size of pupil and light sensitiveness**) tried to determine the influence of age, refraction, peculiarities of iris structure, and so on, in subjects with unusually large pupils. On first going into the dark from the light, persons with large pupils are at an advantage, but later at a disadvantage. After adaptation to dark they are easily dazzled by light and may feel pain. Adaptation is somewhat diminished.

VERAGUTH (449, **Pupillomotor field of the retina**) examined a patient with unilateral optic-nerve atrophy due to penetration of a foreign body into the orbit in childhood. There was a small islet of vision, oval in shape, for white and colors, in the middle of the lower half of the visual field, the upper limit of which reached to 20° below the fixation point. Direct reaction to light was abolished, as was consensual reaction of the other pupil. Illumination of the good eye contracted both pupils, as did convergence, proving the correctness of Hess's view of the extent of the pupillomotor area of the retina.

LEDERER (450, **Localization of pupillary centre**) examined a man of forty-one, three days after a severe contusion of the head. There were general brain symptoms, inequality of the pupils with loss of light reaction in both, limited reaction to convergence and accommodation. Diplopia had been present immediately after the injury. Reaction to convergence and accommodation gradually returned. One and a half years later inequality and bilateral reflex rigidity still persisted, speaking in favor of a hemorrhage between the

small-celled and the large-celled nucleus, according to Bernheimer's scheme.

ALBRAND (451, **Oculistic significance of degenerative stigmata**) found irregularity and pathologic differences of reaction to the point of complete rigidity, either congenital or acquired in early life, in 7% of the cases examined.

LAQUEUR (452, **Pupil reaction in disease**) notes that after section of the optic nerve, in one case of 10, there was loss of direct light reaction with good consensual reaction, after the oculomotor paralysis, which was at first complete, had receded, all but a paresis of superior and inferior rectus, showing that the reflex of convergence reaches the sphincter by a different path from the stimulus of consensual reaction. Amaurosis after hemorrhage. In one case, light reaction disappeared when vision was reduced below $\frac{1}{3}$. Embolism of central artery. The primary light reaction disappeared in partial embolism, with V $\frac{1}{12}$, when the macula was affected even with preservation of a paracentral area, supporting Hess's views as to the extent of the pupillomotor area. In choked disk with marked amblyopia, dilatation with reflex rigidity is not an absolutely bad sign. Retrobulbar neuritis: primary light reaction disappeared in some cases while vision was still fairly good, and returned two or three days before sight. In 20 cases of tabes, hippus was invariably noted, while absolute rigidity was found in 2 and inequality in 3 cases. In optic atrophy from other causes, hippus was found whenever convergence reaction still persisted. In detachment, the pupillary reaction was uniformly the same whether the detached or the still attached area was illuminated. After use of homatropin, convergence reaction disappears later than light reaction and is always the strongest stimulus to the pupil.

LANGMEAD (453, **Pupillary signs in chorea**) noted hippus in many cases of the sthenic form, due to the rapid and irregular motions of the globe and consequent changes in illumination, and to changes in accommodation and convergence. Accommodation reflex may be asynchronous on the two sides, one pupil contracting while the other remains dilated, especially where there is inequality. Contraction to light and convergence is fleeting, showing the effect of fatigue, sometimes in unequal degree on the two sides. Varying inequality of

the pupils and eccentricity are often noted. Similar conditions are noted in articular rheumatism, indicating a similarity of the two affections.

REDLICH (454, **Peculiar pupillary phenomenon: hysterical pupillary paralysis**) caused pupillary dilatation with rigidity, similar to that seen in attacks, in a hysterical woman of thirty-nine, by having the patient cry out or make a muscular effort. The same reaction was noted in epileptics. Convergence reaction persisted during apparently complete dilatation, indicating irritation of the sympathetic as the cause of pupillary reactions in hysteria.

ABELSDORFF (455, **Unilateral reflex pupillary rigidity in oculomotor paralysis**) reports 3 cases in which recovery from oculomotor palsy gave the picture of rigidity to light. One of the cases was traumatic, one luetic, and one associated with herpes. The return of convergence reaction before light reaction is explained as due to associated motion, which paretic muscles respond to most easily.

LEVINSOHN (456, **Meiosis in reflex pupillary rigidity**) considers this condition a cerebral symptom depending on irritation of the Edinger-Westphal nucleus which the author and Bernheimer accept as the starting-point of the centrifugal reflex. The sphincter nucleus consists of two cell groups, one of which converts light stimulus into pupillary contraction, while the second controls the other sphincteric reactions. Disease of the first group causes reflex pupillary rigidity of one or both pupils. If the pathological condition causes irritation of the second group, the result is a meiosis. The author himself notes the difficulty of reconciling this interpretation with the well-known cases of long-standing reflex rigidity complicated with meiosis.

NEUSSEL (457, **Pupil in alcoholism**) used the pupillometer and diagram of Weiler. In 49 cases of pure alcoholism, and 14 complicated with epilepsy, psychoses, and hysteria there was invariably pupillary reaction to sensory or psychic stimuli as well as to convergence. Anisocoria was present in only 3%, light reaction was generally accentuated. Reflex rigidity was not found, and the secondary light reaction was always present. Reaction time was approximately normal.

KOENIG (458, **Ocular symptoms of multiple sclerosis**) reports

3 cases, in one of which, at the beginning of the observation, there was some diminution of the reaction of the pupil to light.

DAVIDS (459, **Ocular conditions in paralytics**) examined 26 cases of paralytic dementia in regard to size, form, light and convergence reaction. There seems to be no uniform relation between the data found and the disease condition, even in case of unequal reaction in the two eyes of one case.

BOOK REVIEWS.

XI.—**Cataract Extraction.** By H. HERBERT, late Lieutenant-Colonel I. M. S. London: Baillière, Tindall, & Cox. Cloth; 8vo. Pages, 391. Illustrations, 97. Price, 12/6.

The author's earlier publication, *The Practical Details of Cataract Extraction*, appeared in 1903, and was reviewed in these ARCHIVES, vol. xxxii., page 512. The present book is a much more elaborate and exhaustive yet very practical presentation of the same subject. Colonel Herbert possesses an experience of 5000 extractions, which surely permits him to speak authoritatively on this operation. In Chapter I., "Operable Cataract," the varieties of cataracts which come to operation are described. Their operability depends on: (1) the cataract must be ripe enough; (2) the pupil must react well to light; and (3) there must be no inflammation about the eye and no iritis or irido-cyclitis of the fellow eye. The ways of artificial ripening are described and some measurements of cataractous lenses are given. In Chapter II., "Description of the Operation," the instruments, preparations, the various steps, finally the dressing and after-treatment, are clearly described and elucidated by illustrations. The author favors the following procedure: A 1 to 3000 perchloride lotion is used to irrigate the conjunctiva for a period of from 1 to 1¾ minutes, the Meibomian secretion is expressed, and the conjunctival sac is finally douched with salt solution. A sclero-corneal section is made with conjunctival flap, followed by a small iridectomy. The capsule is split by a single vertical or oblique incision with cystotome, and the lens is expelled by pressure with a strabismus hook on the lower border of the cornea; the lens remnants are removed by pressure and by irrigation. Chap-

ter III. treats of "Expulsive Hemorrhage," and "Vitreous Accidents." "Variations in Procedure and their Value" are described in Chapter IV. These include simple extraction, Czermak's subconjunctival extraction, extraction of anterior capsule, and removal of lens together with its capsule. Chapter V., "After-complications," describes infective processes, delayed union, secondary glaucoma, and after-cataract. According to Colonel Herbert, the early treatment of after-cataract has become safe and effective. In most cases this consists in a simple division with a narrow knife or knife-needle, otherwise two needles or scissors are necessary. The subject of the final chapter (VI.) is "Complicated and Soft Cataracts."

The vast amount of information collected in this volume makes it extremely valuable and instructive. The presentation of the subject-matter is characteristic of a careful and studious observer and can be recommended as a safe guide. A. K.

XII.—**The Ophthalmic Year Book.** By EDWARD JACKSON, M.D., GEORGE E. DE SCHWEINITZ, M.D., and THEODORE B. SCHNEIDEMAN, M.D. Illustrated. Denver: The Herrick Book and Stationery Company. Vol. VI. 1909. Price $3.

Volume VI. of the valuable Year Book gives a systematic digest of the ophthalmic literature for 1908. This is preceded by biographical notices, and the frontispiece gives a photograph of Snellen. Finally, the publications are enumerated under each author's name. The Year Book is essential to every ophthalmologist desirous of keeping abreast of the year's special literature. A. K.

XIII.—**Manual of the Diseases of the Eye.** By CHARLES H. MAY, M.D. With 362 original illustrations, including 22 plates, with 62 colored figures. New York: William Wood & Company. 1909. Price $2.00 net. Sixth edition.

In the sixth edition, the subject-matter has been revised. Paragraphs on transillumination, the conjunctival tuberculin test, cerebral decompression, have been added. This book continues, with right, to be the most popular short manual on this subject in all languages.

A. K.

XIV.—**Minor Ophthalmic and Aural Technique.** By ALFRED NICHOLAS MURRAY, M.D., Chicago; Assistant in the Department of Otology and Laryngology, Rush Medical College. With 98 illustrations in the text, reproduced from photographs and original drawings. Chicago: Cleveland Press, 1909. Price $3.00.

This book endeavors to describe simple methods of treatment, minor operations, and minor procedure and after-treatment in diseases of the eye and ear. In the part devoted to the eye, the first chapter gives general considerations, and equipment of a specialist's office; Chapters II. and III. give a very elementary outline of the commoner eye affections, with a brief review of anatomy and physiology. Under "Therapeutics and Minor Procedures," Chapter IV., directions are given for the usual manipulations, such as eversion of the lids, instillation of drops, and descriptions of the commoner solutions and medicines employed. Chapter V. gives the main operations and their preparation, with after-treatment. In Chapter VI., dressings, bandages, protective frames, eye-shades, dark glasses, and artificial eyes are described. An appendix with drawings of the usual eye instruments completes the part on the eye. The book contains much useful information and should be of value when the opportunity to acquire this knowledge by active experience and observation in dispensaries and eye hospitals is not given.

A. K.

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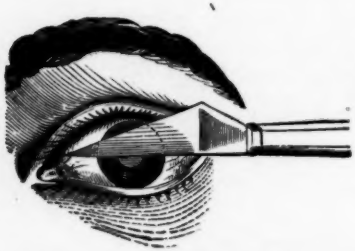

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